

**U.S. Army  
Chemical Materials Agency  
Program Manager for the Elimination  
of Chemical Weapons**

**Project Manager for  
Non-Stockpile Chemical Materiel**

**Explosive Destruction System  
Phase 2 Series Acceptance Test Plan**

**Final**

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**September 2006**

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## **DISCLAIMER**

The Explosive Destruction System (EDS) Phase 2 descriptions and functionality provided in this Acceptance Test Plan are for information only. Fabrication of the EDS will follow requirements provided in the Statement of Work, specifications, and drawing package. The Statement of Work, specifications, and drawing package take precedence over this plan in case of conflict.

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## **FOREWORD**

This plan provides objectives and descriptions for acceptance of the Explosive Destruction System (EDS) Phase 2 (P2) series at the manufacturer's plant, here after referred to as the contractor's location, and at Aberdeen Proving Ground-Edgewood Area, Maryland. The EDS P2 series is a transportable system designed for the treatment of recovered World War I and World War II vintage chemical munitions that are deemed unacceptable for transport by vehicle or long-term storage. The EDS uses shaped explosive charges to access chemical munitions and destroy the munitions' explosive components. After detonation, the munitions' contents are chemically treated within the containment vessel.

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## **1. INTRODUCTION**

The Project Manager for Non-Stockpile Chemical Materiel (PMNSCM) has the responsibility for disposal of the U.S. Army's recovered chemical warfare materiel. Public Law 99-145 requires the Program Manager for the Elimination of Chemical Weapons formerly known as Program Manager for Chemical Demilitarization (PMCD) to carry out the chemical demilitarization mission while providing maximum protection to the public, workers, and environment. Similarly, House Appropriations Report 101-822, which accompanied the fiscal year 1991 Defense Appropriations Act (Public Law 101-510), established the Non-Stockpile Chemical Materiel Project (NSCMP). The NSCMP is responsible for providing centralized management and direction for the safe destruction of all non-stockpile chemical materiel in the United States in accordance with (IAW) all applicable federal, state, and local laws and regulations.

PMNSCM, in conjunction with Sandia National Laboratories (SNL), developed transportable destruction units that can safely destroy munitions that may be moved manually but will not withstand mechanical handling or transport. These units are referred to as the Explosive Destruction System (EDS). Two versions of the EDS have been developed: the EDS Phase 1 (P1) and the EDS Phase 2 (P2). The EDS P1 version is designed to handle the explosive force of up to the equivalent of 1.5 pounds of trinitrotoluene (TNT). The EDS P2 version is designed to handle the explosive force of up to the equivalent of 4.8 pounds of TNT. Both EDS P2 Units 1 and 2 (U1&2) have undergone combined developmental/operational testing, and follow-on testing, and they have been fielded. The EDS P2 Unit 3 (U3), which is virtually identical to the EDS P2 U1&2 in both its hardware and operational procedures, will only be subjected to acceptance testing.

## **1.1 Objectives**

The objectives for the EDS P2 series acceptance are the following:

- Conduct quality control (QC) audits to confirm that the manufacturing/assembly process conforms to the specifications
- Validate the physical EDS P2U3 hardware with the drawing package
- Perform contractor testing of components and subsystems (systemization test) and verify form, fit, and function of the assemblies (limited functional test)
- Conduct an operational and maintenance validation of the EDS P2U3 hardware using approved procedures.

## **1.2 Concept**

The government will conduct audits during the manufacturing process, and the contractor will conduct in-plant systemization testing and a limited in-plant functional test (form, fit, and function). After the item is shipped to Aberdeen Proving Ground (APG), the government will conduct a test at the Edgewood Area, which will focus on operations and maintenance validation utilizing the approved Standing Operating Procedure (SOP) and maintenance procedures. The system will be formally accepted by the government upon successful completion of testing.

## **1.3 Scope**

The EDS P2U3 acceptance testing will be conducted in three distinct phases.

**1.3.1 In-Plant Assembly – Government Quality Control/Audits and Physical Configuration Audits.** During the manufacture and assembly of the system, milestone

QC/audits and Physical Configuration Audits (PCAs) will be conducted by government representatives.

**1.3.2 In-plant Assembly – Contractor Testing.** Contractor testing of components and subsystems (systemization test) will be conducted IAW government approved, contractor developed test plans. At the completion of system assembly, a contractor conducted limited functional test consisting of form, fit, and function will be conducted IAW system maintenance and operating procedures. Contractor test reports will be provided to the government.

**1.3.3 Delivery to APG – Government Acceptance with Operation and Maintenance Validation.** The system will be subjected to an O&M validation conducted by the government.

## **1.4 Limitations**

Acceptance for EDS P2U3 at Aberdeen Proving Ground-Edgewood Area (APG-EA) has the following limitations:

- Personnel expertise not specifically associated with EDS operations will not be checked.
- Removal of the EDS P2U3 from the test facility, offsite transportation, or treatment of generated wastes will not be evaluated unless specifically contained as an operational step in the EDS P2 Series SOP.

## **1.5 Schedule**

TBD.

## 1.6 System Description

**1.6.1 Hardware.** The EDS P2, as depicted in figure 1, is comprised of the following subsystems:

- Trailer Subsystem
- Containment Vessel Subsystem
- Clamp Hanger Subsystem
- Hydraulic Nut Subsystem

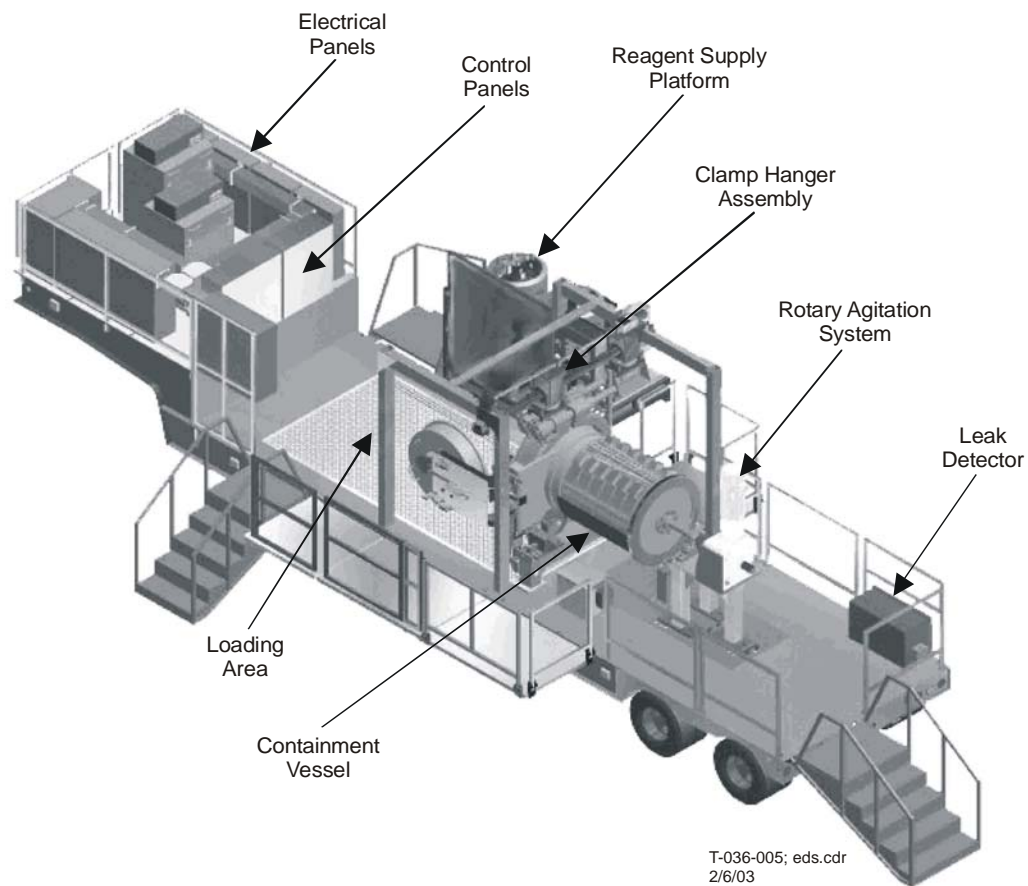


Figure 1. The EDS P2

- Rotary Agitation Subsystem
- Helium Supply and Leak Detector Subsystem
- Reagent Supply Subsystem
- Waste Transfer Subsystem
- Electrical Subsystem
- Explosive Opening Subsystem.

*Trailer Subsystem.* All the primary components of the EDS P2 are mounted on an 8-1/2 by 39-1/2-foot long perimeter frame single-drop trailer. The overall dimensions of the trailer in its operational configuration (to include the stairs) are 20-1/2 by 45 feet. The overall height from the ground to the top of the trailer is approximately 12 feet in its traveling configuration. The trailer's ground clearance is 23-3/4 inches. The working deck surface is 42 inches from the ground.

The front upper deck of the trailer (the gooseneck) houses the electrical enclosures; the lower deck is the working deck where the vessel is mounted. A secondary containment pan or sump is under the working deck, is covered by stainless steel (SS) grating, and has spray nozzles to flush it with water. A fold-out platform for the Reagent Supply Subsystem hinges at the edge of the working deck, has folding adjustable legs for support in the extended position, and has a secondary containment pan. Two hydraulic cylinders are used to lower the platform during operations and raise it during travel. An air-operated, double diaphragm pump is used to drain the secondary containment pans. The trailer has additional fold-out platforms on each side for personnel access around the vessel and clamp hanger.

The trailer features include the following:

- *Materials and Paint.* All materials on or above the deck of the trailer are constructed of SS. All structural steel features and assemblies below the deck are undercoated with epoxy mastic and top-coated with epoxy enamel.
- *Stairs.* Three sets of SS stairs are used to access the trailer—one on each side of the working deck and one at the rear of the trailer. The stairs are hinged at the edge of the deck and raised onto the deck for travel. Raising and lowering the stairs is assisted by the use of air cylinders (shocks, not powered).
- *Leveling Jacks.* Four hydraulically-controlled leveling jacks are located under the trailer—two at the transition between the gooseneck and working deck on each side of the trailer and two between the two rear axles.
- *Railings.* SS railings extend around the perimeter of the trailer. Some of the railings are removable to provide access to the working deck and others fold up for transport.
- *Tarp.* A two-piece vinyl tarp (supported by removable ribs) is used to cover the entire trailer down to the frame. The tarp is secured with hooks around the edge of the trailer during storage and transit.
- *Tie-Down Lugs.* Welded lugs on the trailer can be used to secure the trailer on an aircraft or a ship.

*Containment Vessel Subsystem.* The containment vessel is designed to contain the munition(s), blast, and fragments from the detonation of the shaped charges. The



vessel also serves as a reactor for chemical treatment after the munition(s) fill is accessed.

The 21.2-cubic foot vessel assembly consists of the 316 SS vessel and door, vessel door hinge, valve/sample panel, ethylene propylene diene monomer (EPDM) O-ring, Grayloc<sup>®</sup> all-metal door seal, and vessel heaters with an insulated shroud. The vessel, fabricated by Grayloc<sup>®</sup> Products, is designed to contain repeated detonations of up to a net explosive weight of 4.8 pounds (TNT equivalent). The vessel body is a 62-7/8-inch long cylindrical cup with an inside diameter of 29-1/4 inches and walls that are 3-1/8 inches thick (includes a 1/8-inch damage allowance); the rear is 6-1/2 inches thick. To aid in agitation, the interior of the vessel has two welded in-line T-shaped paddles (each 3-1/16 inches tall by 4 inches wide by 19 inches long). The vessel was designed and fabricated to American Society of Mechanical Engineers (ASME) *Boiler and Pressure Vessel Code, Section VIII, Division 1* (1995 Edition) and tested to 4,200 pounds per square inch (psi) to provide a rated working pressure of 2,800 psi at 125°F.

The vessel door, hinged to provide access to the vessel's interior, is a 9-inch thick plate the same diameter as the vessel. Vessel door features include the following:

- *Door Hinge and Vessel Door Support Jack.* The door hinge assembly consists of the hinge pin, bushings, and adjustment screws for vessel door alignment. The vessel door support jack supports the weight of the door when opened. A mechanical interlock prevents the door from being open unless the jack is properly positioned.
- *Feedthroughs.* The door has four drilled-through machined ports for fluid, electrical, and diagnostic feedthroughs. Three of the vessel door feedthroughs are configured to accommodate fluids: a fluid drain line port, gas sample/fluid inlet port, and liquid sample port. The inner threads of these ports are counter-bored into the door to protect the threads. The

inner face of the fluid drain line has a 1/2-inch diameter dip tube with a screen to prevent blockage of the port by solid wastes.

The gas sample/fluid inlet port has a spray nozzle that is flush with the inner door surface. The liquid sample port, also used as a backup drain line when fitted with an adapter, has a 3/8-inch dip tube. The outer faces of these ports are machined to accept 3/8-inch high-temperature (450°F), medium-pressure (20,000 psi) packed-stem Autoclave™ valves with metal-to-metal seals. These valves provide no visual indication of their position.

The fourth vessel door feedthrough is a 2-43/64-inch hole that is used for the electrical feedthroughs. Four electrical high-voltage feedthroughs are assembled on an 8-1/2-inch diameter by 2-3/4-inch thick SS flange that is secured to the door with eight 3/4-inch bolts and sealed using a Grayloc® metal seal with an EPDM O-ring.

Although the feedthroughs were designed to minimize damage caused by fragment impact during detonation and vessel rotation by concentrating them along the outer perimeter of the vessel and recessing them into the door, a door protector plate is used to provide additional protection for the ports.

The vessel door also has a machined, in-place, thermowell for a standard thermocouple. The thermowell end is flush with the inside of the door. On the inner side of the door, a 2-inch deep, 1/2-inch radius countersink is machined around the end of the thermowell to improve temperature measurement.

- *Sample Assemblies.* The vapor sample valve assembly, liquid sample valve assembly, and drain port assembly are attached to their respective ports on the exterior of the vessel door. Samples are collected in a

25-milliliter (mL) SS sample bottle attached onto the bottom port of a three-way medium-pressure valve that is installed in the sample valve assembly. The two sample assemblies are mounted on horizontal slide brackets and have a shutoff quick-connect for the supply, helium, and vacuum hoses. The drain port assembly consists of two medium-pressure valves in series. A pressure transducer is located between these valves, and a quick-connect that connects to the vessel effluent hose is located after the second valve.

The vessel and its contents are heated by six external 7.5-kilowatt (kW), 480 Volt (V), single-phase band heaters. An insulated metal shroud covers the band heaters. Power to the heaters is through a 50-ampere slip ring on the vessel rear end shaft. A temperature controller for the band heaters is located on the vessel control panel.

*Clamp Hanger Subsystem.* The Clamp Hanger Subsystem is used for opening and closing the vessel door clamps as well as to support the weight of the vessel door clamps while the vessel door is open. This subsystem consists of two clamp hanger assemblies (one for each clamp half) with proximity sensors, two drive pin assemblies that each attach to a clamp hanger assembly and a lead screw with an electric drive motor, weight supporting structure, a control panel, and a pendant control.

*Hydraulic Nut Subsystem.* Once the vessel door is closed, knurled nuts on the ends of the threaded rods are turned by hand until the initial required gap is obtained between the clamps. The clamps are closed to the final required gap by use of the hydraulic nuts, which provide the required pre-load on the vessel clamp to ensure gas-tight vessel operation. The hydraulic nut pump supplies hydraulic pressure to the hydraulic nuts to load or stretch the threaded rods axially. Once the required load or stretch is achieved, locking rings are hand-tightened against the hydraulic nuts to retain the load; the hydraulic pressure is released; and the hydraulic line is then disconnected. The hydraulic nut pump is operated from the vessel control panel or a pendant control.

Releasing the hydraulic nut pressure from the clamps is carried out by repressurizing the hydraulic nuts with a higher pressure and backing the locking rings off the four nuts. Following release of the pressure, the knurled nuts are manually loosened.

*Helium Supply and Leak Detector Subsystem.* This subsystem is comprised of a commercial helium gas cylinder, two pressure regulators with gauges, tubing to transfer helium from the helium gas cylinder to the vessel, and a helium leak detector connected by tubing to the vacuum flange on the vessel door or high-voltage feedthrough flange. The vessel is charged with helium to determine the effectiveness of the Grayloc<sup>®</sup> seals by detecting and quantifying any helium leakage from the vessel into the annular space between the Grayloc<sup>®</sup> seals and EPDM O-rings. The helium leak detector is normally operated via a hand-held remote control but can also be operated using the instrumentation panel on the helium leak detector. Helium is also used to assist draining and flush vapors from the vessel's interior after munition treatment prior to opening the vessel door.

*Rotary Agitation Subsystem.* The vessel, which is supported on casters, is rotated using a rotary drive system mounted behind the vessel and attached to the vessel by a shaft with a coupler. It consists of a 3 horsepower, 480 V, 3-phase motor with a gearbox, variable frequency drive, and process controller. This subsystem is operated from the vessel control panel or pendant control. The vessel automatically rotates at a speed of 1 revolution per minute. Maximum speed is 1.9 revolutions per minute. The home position is defined as the door hinge at the 3 o'clock position. During draining, the hinge aligns to the 6 o'clock position; during sampling and filling, the hinge aligns to the 9 o'clock position.

*Reagent Supply Subsystem.* Reagents used for chemical treatment and water used for rinsing are stored in two 65-gallon (245-liter) SS tanks. Tank 1 is intended for water, and Tank 2 is intended for reagents. Each tank has an external heater (8 kW, 480 V) on the bottom to prevent freezing, to make viscous fluids easier to pump, and to preheat the reagents to facilitate treatment of the chemical fill. Air gap shrouds are used to protect the workers from coming in direct contact with the hot tanks. Each tank has a

temperature controller located on the process control panel, and the temperature in each tank is measured by a thermocouple. The tanks are ASME-rated for 60 psi at 212°F but operate at atmospheric pressure. Magnetic float level gauges provide a visual indication of the liquid level, and a low-level switch with alarm cuts power to the tank heaters when activated.

Two air-operated double diaphragm pumps are used to transfer reagent and water into their respective supply tanks. The water pump is also used to supply water to the nozzles in the secondary containment pan.

Both tanks can be rinsed or filled with water through a spray nozzle located at the top of each tank. Reagent is normally supplied to the reagent supply tank from the bottom of the tank. Transfer lines from the supply pumps are connected to the tanks with SS tubing, fittings, and Teflon<sup>®</sup>-lined SS braided flex hoses. The reagent supply panel contains the valves that control the Reagent Supply Subsystem, and the adjacent hose docking station holds the various hoses during vessel rotation.

Wanner Engineering Hydra-Cell<sup>®</sup> air-driven pumps are used to transfer reagent and water from their respective supply tanks to the vessel. The supply pumps are capable of providing 2 gallons per minute at up to 1,000 psi. Check valves prevent back flow of fluids from the vessel.

*Waste Transfer Subsystem.* The liquid effluents are drained from the vessel to a standard 55-gallon waste drum. Each drum is protected from over-pressurization by a 10-psi rupture disc. In the event of a disc rupture, an alarm sounds, and a valve automatically closes to halt the flow of effluent into the waste drum. Two liquid waste drums (waste drums 1 and 1A) are connected to a three-way selector valve in the drain line from the vessel. The valve is switched to fill the second drum (waste drum 1A) with water rinses, whereas the first drum (waste drum 1) is filled with neutralent. These drums are vented through a vapor pass through drum (waste drum 2) that exhausts to either a carbon filter canister or a General Purpose Operations Shelter filter. The third drum (waste drum 3) is used to collect any liquids that have collected in the secondary

containment pans. Waste drums 1, 1A, and 3 sit in secondary spill containment on mechanical 1,000-pound capacity scales. An open-top drum is used for solid wastes.

*Electrical Subsystem.* The Electrical Subsystem provides the required 480 V, 3-phase electrical power for the vessel, supply tank heaters, rotary agitation, and drive motor. Conditioned 120 V power is supplied to other subsystems. Electrical power can be supplied by utility power (130-ampere minimum) or by a generator (165 kW, 480 V mobile generator). During operations, the electrical load is normally 54 to 70 kilovolt-amperes (kVA) (maximum of 123 kVA), and the system draws between 40 to 70 amperes (maximum of 126 amperes). Electrical enclosures in the process area meet the National Electrical Manufacturers Association (NEMA) 4X requirements for outdoor and corrosive use; all others are specified as NEMA 4 for outdoor use. The heating and monitoring system for the supply tanks is designed to meet National Electrical Code Class 1, Division 2 Area Classification. Electrical Subsystem features include:

- *Power Distribution.* The main 480 V power distribution panel distributes necessary power to 480 V process equipment. A 30 kVA transformer steps down the 480 V to 208/120 V, and a second power distribution panel distributes power to 120 V process equipment and utility systems.
- *Grounding.* All electrical and mechanical equipment is grounded through a bonding system on the trailer frame to a common ground.
- *Utilities.* Several dedicated 120 V receptacles and some with ground fault circuit interrupters are installed throughout the trailer. One receptacle is dedicated and labeled as "Sensitive Equipment Only."

*Explosive Opening Subsystem.* Explosive shaped charges are used to access the munition(s), thereby releasing the chemical fill into the vessel. The shaped charges are also used to attempt to destroy the munition(s) burster explosives (if present). This

subsystem consists of the Firing System and the Fragment Suppression System (FSS), which includes the following:

- *Firing System:* The Firing System is comprised of two separate independent firing sets designed to reliably fire up to six exploding bridge-wire detonators. The Firing System is connected to the detonators in the vessel using 50-foot detonator cables and can be remotely operated through a detachable control module that allows the operator to arm and fire the Firing System from 18 inches up to 300 feet away. Including the separation provided by the 50-foot detonator cables, the operator can detonate the shaped charges while being up to 350 feet from the vessel. The Firing System includes various features necessary to safely fire the detonators and to test and monitor the system and detonator cables. One of these features is a safety interlock plug to prevent inadvertent operation of the system.
- *FSS:* The FSS serves as a structural framework to connect, hold, and align the explosive charges used for munition opening and burster charge detonation. It also protects the interior surfaces of the vessel from the high velocity fragments from the shaped charges, burster casing, and munition(s).

The lower half of the FSS cylinder is connected to a sheet metal frame that holds it off the bottom of the vessel. Between the frame and the lower half is a stopper block that stops the residual conical-shaped charge (CSC) jets. The munition holder, which also holds the linear-shaped charge(s) (LSC(s)), is mounted inside the lower half of the FSS.

The upper half of the FSS cylinder has holes drilled in the top for two CSCs, which are held firmly in place using O-rings and aimed in the direction of the munition(s) burster. Endplates are positioned at each end

of the assembled FSS cylinder halves to protect the ends of the vessel, except when using the FSS for a 155-mm or 8-inch projectile.

A typical FSS is depicted in figure 2. There are eight different FSS(s) which can be used based on munition size, and number of munitions to be processed at one time.

- **CSC:** CSCs are used to puncture a munition's burster and attempt to detonate the burster's explosives. The CSC is a Composition A-3, multi-tapered, copper-line CSC. The design of the CSC is such that the criterion for reliable detonation of the burster explosives by impact of the shaped charges is exceeded. This is necessary due to the effects of explosives aging or the possible contamination of the explosive by the chemical fill.
- **LSC:** The LSC is used to access the main body of the munition to expose the contents for chemical treatment. The primary requirement, cutting the walls of the munition, is accomplished with pre-formed length(s) of copper-sheathed LSC with a cyclonite (RDX)-based explosive filler. The shape, length, and grains per foot of the LSC are specific for the type of munition to be treated. For multiple munitions, the LSCs are also used to disrupt the explosive train of the munitions.<sup>1</sup>
- **Detonators:** The Firing System is used to simultaneously initiate the LSCs. The detonators used to initiate the LSCs are Reynolds type RP-1<sup>®</sup> exploding bridge-wire detonators. These detonators are insensitive to unexpected or undesirable energy inputs (static, impact, etc.) and are detonated by the discharge of high current through the bridge-wire. The bridge-wire explodes and produces a shock wave, which, in turn, initiates the explosive in the shaped charges. The RP-1<sup>®</sup> detonators have a

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<sup>1</sup> As the burster(s) may not actually detonate, the solid debris is inspected for intact or partially intact explosive components after the treatment process is complete.



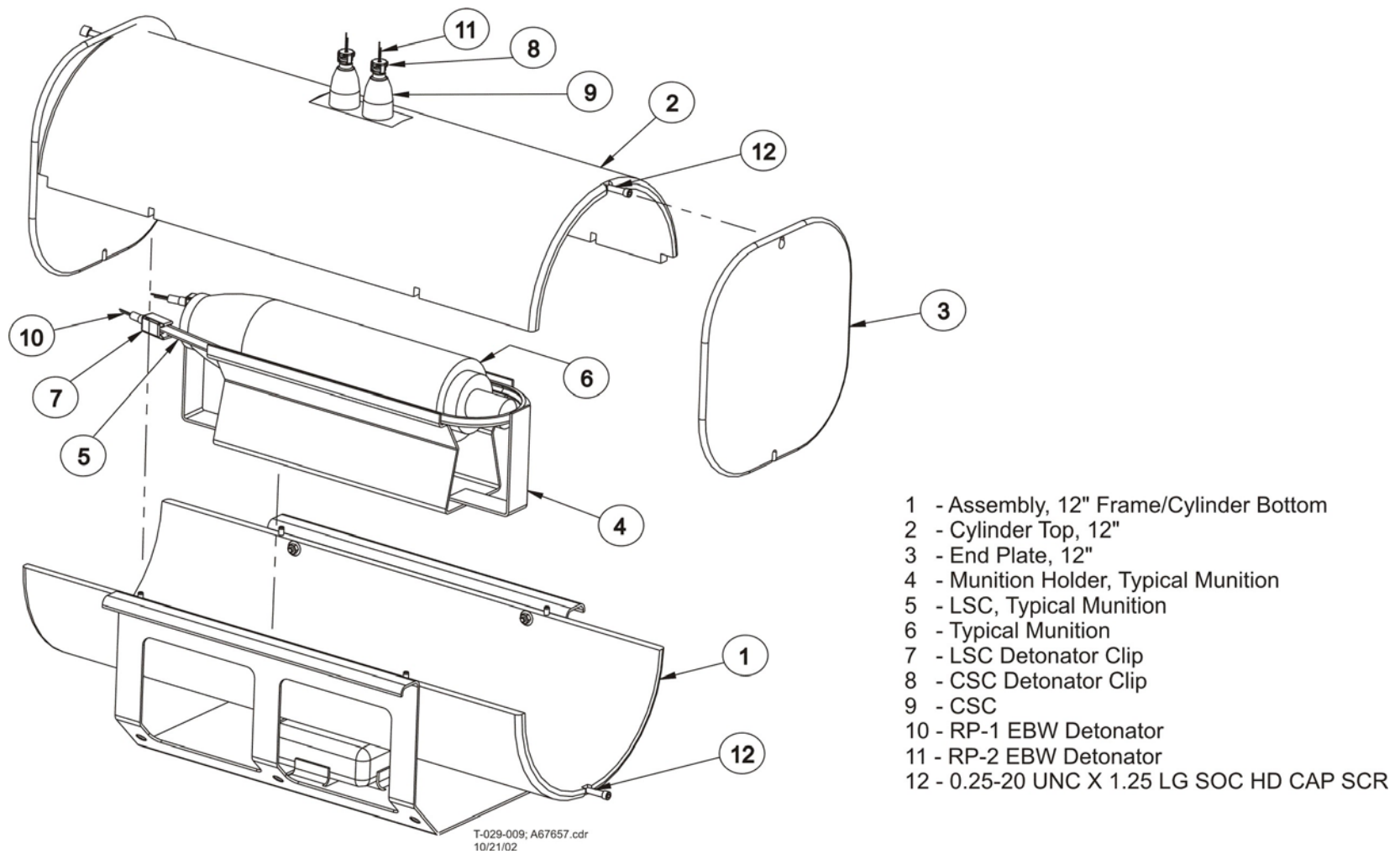


Figure 2. Typical FSS/Munition Holder

251-milligram pentaerythritol tetranitrate explosive, a 375-milligram RDX with binder output pellet, a 315-ampere at 415 kW ignition requirement, and a 2.75 microsecond function time.

Two exploding bridge-wire detonators are connected to each piece of LSC, strain relieved, and then electrically shorted until the FSS is positioned in the vessel.

**1.6.2 Required Support Systems.** Although the following services and facilities are not part of the EDS P2, they are required to support the system:

- Air compressor (capacity of 185 cubic feet per minute at 150 pounds per square inch gauge [psig])
- Electrical generator (capacity of 165 kW [206 kVA], 240 to 480 V, 3-phase)
- Test facility (see paragraph 1.2)
- Explosives transport and storage (only required for APG-EA test)
- Disposal facility for generated wastes
- Medical and emergency response personnel (only required for APG-EA test).

**1.6.3 Government-Furnished Equipment.** The following equipment will be provided by the government during in-plant and APG-EA testing:

- EDS Containment Vessel
- Hydraulic nuts for clamps

- Trailer including vertical supports for clamp hanger assembly, tarp and bow system, and clamp hanger software program (to be purchased/fabricated by SNL through contract with Trail King Industries)
- Waste drums, waste drum carbon filters, drum heater temp controller and heaters, scales, drum pump assembly, and 55-gallon drums
- Fire Set (This includes the fire set “box” and the components therein, as well as the high voltage cables and adapter. The high voltage flange/feedthrough will be included in the contract.)
- Sample Bottle Assembly (A69030 assembly)
- Flushing chamber weldment (A67210-P2)
- Tedlar Bags
- FSSs, munition holder, explosives (components of the explosive opening subsystem)
- Grayloc<sup>®</sup> door seal and O-ring
- Commissioning parameters and software program for Sew Eurodrive
- Generators, maintenance/supply trailers, air compressors, and any tools necessary to support testing not included in the contract will be government-furnished equipment.

## **1.7 Functional Description**

Normal EDS P2 operations can be described by the following procedural steps:

- a. Arrival and set up of the EDS P2 and EDS operations site
- b. Conduct a pre-operational survey (required only for APG-EA test)
- c. Select reagent(s) and fill the supply tanks (water will be used for in-plant testing)
- d. Receive and unpack the munition(s), if overpacked (not required for in-plant testing)
- e. Assemble the munition(s) into a FSS with shaped charges (not required for in-plant testing)
- f. Load prepared FSS into the vessel, close and seal the door, and confirm the door seal (prepared FSS not required for in-plant testing)
- g. Remotely detonate the shaped charges (not required for in-plant testing)
- h. Transfer reagent to the vessel (water will be used for in-plant testing)
- i. Heat (fill-dependent) and agitate the contents of the vessel
- j. Monitor the vessel temperature and pressure
- k. Collect liquid sample from vessel
- l. Drain treated liquid waste from the vessel

- m. Treat/rinse the vessel with water (temperature, volume, and length of agitation are based on the chemical agent being treated)
- n. Drain rinsewaters from the vessel
- o. Flush vapors from the vessel with helium
- p. Sample vessel headspace
- q. Open the vessel door
- r. Inspect and remove solid wastes
- s. Rinse the vessel with water
- t. Prepare for the next munition or decontaminate
- u. Prepare the EDS P2 for re-deployment.

*Setup.* The EDS P2 and associated support equipment are set up, inspected, and prepared for operations upon arrival at the treatment location. During setup, secondary containment is established under and around the EDS P2 trailer. If electrical power is not available from a nearby utility power source, an electrical generator is used. Any necessary equipment/instrument calibrations are performed.

After the EDS P2 is set up and inspected, background air monitoring is completed IAW Site Monitoring Plan requirements. A pre-operational survey is conducted before commencing hazardous operations.

*Munition Accessing.* The munition(s) are transported to the EDS P2, unpacked, and placed into a munition holder located in the lower halves of the FSS cylinder. The shaped charges are placed onto the munition holder, and the upper halves of the FSS

cylinder are placed on the lower halves. The pre-checked detonators are attached to the charges and electrically shorted for safety. Once the FSS is assembled, it is placed into the vessel.

Once the entire assembly—munition(s), FSS, and shaped charges—has been placed inside the vessel, the final detonator connection is made using the interior detonator jack. With a clean and dry lubricated sealing surface, the Grayloc® seal mounted on the vessel's sealing surface, and the EPDM O-ring properly seated in the door, the door is closed. The knurled nuts are then tightened using wrenches and the hydraulic nuts.

The proper installation of the Grayloc® seals on the vessel door and the high-voltage flange are then confirmed by helium leak testing. Afterwards, IAW PMNSCM policy, the firing sequence is initiated and the explosives are detonated.

*Chemical Treatment.* Appropriate reagent is transferred to the vessel to treat the chemical fill after detonation.

The treatment of the chemical agent and decontamination of the munition fragments is accomplished within the sealed vessel.

As an example when processing HD-filled munitions, the vessel is heated to 140°F (60°C) and agitated for up to 4 hours after addition of the 90 percent monoethanolamine, (MEA) corrosive reagent (preheated to 60°C). Afterwards, the liquid wastes are drained into a waste drum, and the vessel is rinsed with clean water. For processing HD filled munitions, the first water rinse is preheated to 60°C and then heated to 100°C inside the vessel with continued agitation for 2 hours after the vessel contents have reached 100°C. A second rinse is performed using ambient temperature water. The vessel is then flushed with helium, and a headspace vapor sample is taken to verify that chemical agent vapor concentration in the vessel is below hazardous levels before opening the vessel door. The solid wastes are visually inspected, removed from the vessel, placed into a waste container, and sealed. Should any explosive components be found, they are segregated from the other solid wastes. The

vessel is cleaned to remove any remaining solid debris. Drums and containers containing waste products are stored and managed as hazardous waste.

*Preparation for Next Munition.* Prior to treatment of subsequent munition(s), the vessel is systematically cleaned and inspected. This process includes visually inspecting the vessel, its sealing surface, and its door; making any necessary repairs; replacing the Grayloc® seal and EPDM O-ring on the vessel door; and replacing the electrical feedthroughs, as necessary.

*Closeout.* Upon completion of operations, the EDS P2 is closed out. Closeout activities include cleaning and decontaminating the vessel and equipment to a 3X condition, stowing all equipment and supplies, transferring hazardous waste to an approved treatment, storage, and disposal facility (or arranging for this transfer), and preparing the EDS P2 and associated support equipment for transport from the treatment location.

## **1.8 Organizational Responsibilities**

**1.8.1 Management.** PMNSCM has overall responsibility for the acceptance of the system. The contractor is responsible for the in-plant systemization test and limited functional test. PMNSCM is responsible for the in-plant PCA, quality control checks, and APG-EA operational and maintenance validation test.

### **1.8.2 Personnel Requirements.**

- Personnel working with explosives must comply with the requirements of Army Materiel Command Regulation 350-4, *Training and Certification Program for Personnel Working in Ammunition Operations*.

- In-plant PCA – At least two government representatives conducting the audit assisted by contractor personnel.
- In-plant contractor conducted testing – Personnel as specified by the contractor test plan and provided by the contractor. Contractor personnel will operate the system observed by a government representative(s).
- Edgewood Chemical Biological Center (ECBC) and SNL will provide subject matter experts to assist as needed.
- Operational and maintenance validation test at APG-EA – ECBC will provide a test director, operators, and maintenance personnel. SNL will provide subject matter experts. The contractor will provide observers and maintenance personnel for repair of non-government-furnished equipment (GFE) EDS components.

### **1.8.3 Equipment, Tools, and Materiel.**

- Support equipment, tools, and special tools (see paragraph 1.6.3), necessary for the operation of the EDS P2U3 will be provided by ECBC for both in-plant and APG-EA testing.
- Test, measurement, and diagnostic equipment (TMDE) will be provided by the contractor during in-plant testing. TMDE required during operational and maintenance validation testing at APG-EA will be provided by ECBC.
- Simulation Equipment Test Hardware (SETH), explosives, simulants, and reagent will be provided by ECBC.



#### **1.8.4 Quality Assurance.**

- The PMCD Quality Assurance Program Plan, Revision 2, implements the requirements of the American National Standards Institute/American Society for Quality Control Q9001-1994 *Quality Systems-Model for Quality Assurance in Design, Development, Production, Installation, and Servicing*. PMNSCM applies the requirements of the Quality Assurance Program Plan to enhance its confidence that the following objectives are met: (1) maximum protection for personnel, the general public, and the environment, and (2) assurance that data are representative, accurate, and defensible.
- A Participant Quality Assurance Plan, together with approved quality assurance plans for design and fabrication procedures used by support organizations, defines a quality system that satisfies the applicable requirements of the PMCD Quality Assurance Program Plan.

#### **1.8.5 Risk Management.**

- Risk management provides a framework in which operations can be safely performed within the bounds of security, surety, and environmental limitations. System safety is applied with the goal of improving operational effectiveness by conserving valuable resources and reducing inherent risks. Safety assessment procedures follow guidelines contained in Military Standard-882D; DA Pam 385-61, Appendix F; and *System Safety Management Plan for the Non-Stockpile Chemical Material Program*. A single, closed-loop hazard tracking system has been developed for the EDS P2 series and allows hazards to be tracked from analysis input to system closure. This tracking system is documented in the *EDS Phase 2 Series Hazard Tracking Log*.

#### **1.8.6 Health and Safety.**

- Safety requirements for conducting explosive operations are contained in Army Regulation 385-64, *Ammunition and Explosives Safety Standards*, and its associated DA Pam.
- Additional safety tasks have been completed to ensure the safety of the EDS P2U3 operation. These include a system hazard analysis, hazard tracking and risk resolution, job hazard analysis, and site safety plan and safety submission. These will be utilized to safeguard personnel and environment.

#### **1.8.7 Security.**

- The contractor will provide adequate in-plant security during the manufacturing process.
- The physical security procedures in force at the APG-EA Prototype Detonation Test and Destruction Facility (PDTDF) facility/site satisfy the requirements for the EDS P2U3 and its associated test items and materials. The areas around the APG-EA PDTDF facility/site will be restricted, and entry to the facility/site will be controlled by the test director.

#### **1.8.8 Environmental.**

- Chemical weapons will not be introduced into any testing.
- Water will be used to simulate reagent and chemical munition fill during the in-plant testing.

- Water will be used to simulate reagent and chemical munition fill during the first trial at the APG-EA operational and maintenance validation. During the last trial, methyl salicylate will be used to simulate a chemical munition fill; MEA will be used for the reagent, and a 155-mm casing burster will be explosively configured.

#### **1.8.9 Public Outreach.**

- Requests for release of any public information will be referred to the NSCMP Public Affairs Office (410-436-3445).

### **2. GOVERNMENT CONDUCTED QUALITY CONTROL DURING ASSEMBLY**

The purpose of the QC inspections and verifications during and at the completion of EDS fabrication is to ensure the EDS conforms to requirements specified in the technical data package (TDP) including specifications, drawings, and other design documents. The Quality Control Checklists (appendix B) were developed from requirements contained in the TDP. Criteria for each inspection item are specified or referenced in the Quality Control Checklists. The QC inspector will have sufficient experience and qualifications in manufacturing processes and engineering principles to perform the inspections and will be required to validate each item in the checklist by signature. Supporting contractor data used for validation will be attached to the checklists.

### **3. CONTRACTOR CONDUCTED SYSTEMIZATION TESTING**

Contractor developed, government approved test plans will be used by the contractor to conduct in-house testing IAW the contract specifications and statement of work. Specific systemization areas of test and inspection are included in appendix C. The contractor will notify the government a minimum of 5 working days prior to conducting testing. Government representatives will observe testing.

## **4. GOVERNMENT CONDUCTED PHYSICAL CONFIGURATION AUDIT IN PLANT**

### **4.1 Objectives**

The objective of the PCA is to validate that the EDS P2U3 hardware conforms to the configuration documentation.

### **4.2 Criteria**

The EDS P2U3 hardware conforms to the configuration documentation.

### **4.3 Procedures**

The PCA will be conducted at the contractor's location concurrently during manufacturing and assembly and during the systemization test by government representatives.

The PCA will determine if there are discrepancies between the government selected drawings and the EDS P2U3 hardware.

### **4.4 Data Requirements**

- Selected drawings from the TDP
- Discrepancies between the selected drawings and the EDS P2U3 hardware.

#### **4.5 Data Analysis**

Data analysis will be an assessment of the discrepancies between the EDS P2U3 hardware versus the TDP and will vary from audit to audit depending on the parts of the TDP/hardware that are evaluated.

#### **5. CONTRACTOR CONDUCTED LIMITED FUNCTIONAL TEST INCLUDING FORM, FIT, AND FUNCTION IN PLANT**

The objective of the limited functional test is to determine that the EDS P2U3 is operating properly and ready to support the operational and maintenance validation testing at APG. Each of the subsystems must be capable of operating during normal and other than normal conditions. Selected operating procedures of the EDS P2 Series SOP to be incorporated into the contractor developed test plan are listed in appendix D. Each task will be successfully demonstrated one time. The contractor provided test data will be compared to the criteria/specifications, and a determination will be made to the readiness of the EDS P2U3.

#### **6. GOVERNMENT ACCEPTANCE WITH SETUP, OPERATIONS, AND MAINTENANCE VALIDATION AT APG-EA**

The government validation of EDS setup, operation, and maintenance activities will be conducted at the PDTDF, J-Field, APG-EA.

##### **6.1 Objectives**

The objectives of the system setup are to validate that the EDS P2U3 and its associated items and materials are present, complete, and in satisfactory condition to conduct operations. The objective of O&M functional validation is to perform a functional system check of the EDS P2U3.

## **6.2 Criteria**

- The EDS P2U3 is assembled, complete, and ready to conduct operations.
- Required tools, spare parts, and expendables are on-hand, complete, and undamaged.
- All safety and emergency response equipment and supplies are in place and ready to use.
- Required support equipment is on-hand and functional.
- The EDS P2U3 is successfully setup and operated IAW with the appropriate approved SOP.
- The EDS P2U3 is successfully maintained using select procedures from the approved O&M manual.

## **6.3 Procedures**

The EDS P2U3 and all ancillary/support equipment will be inspected for completeness and any damage by the government. Repairs, adjustments, and calibrations will be accomplished by the contractor for those items required to be built/furnished by the contract Statement of Work. GFE will be repaired, adjusted, and/or calibrated by the government.

The system will be set up, and pre-operational system checks performed IAW approved procedures, appropriate checklists, and O&M manual.

The following maintenance procedures from the O&M manual will be exercised:

- Inspect and Leak Test the Vessel Door Panel Assembly and Feedthrough Flange (Operator Maintenance Procedure, CNV-3)
- Inspect and Adjust the Vessel Door Hinge (Operator Maintenance Procedure, CNV-11)
- Flush and Drain Reagent Supply System – Water (Operator Maintenance Procedure, RSS-6)
- Refilling and Purging Waste Drums Scales (Operator Maintenance Procedure, WTS-6)
- Inspect Electrical Panels (Operator Maintenance Procedure, ELC-2)
- Test Supply Tank Heaters (Support Maintenance Procedure, SM-RRS-4).

The first trial will be comprised of using water to simulate reagent and rinse. A simulated GB, (water) filled 155-millimeter (mm) SETH (non-explosively configured) will be processed. Normal processing steps will be followed IAW the appropriate procedure of the EDS P2 Series SOP.

The second trial consists of processing an explosively configured 155-mm munition casing filled with methyl salicylate (oil of wintergreen) simulating a GB fill. No chemical agent filled items will be processed. MEA will be used as the reagent and heated to 60°C IAW the appropriate procedure of the EDS P2 Series SOP.

If failures occur, the failed component/part will be repaired/replaced and re-tested. At the conclusion of the two trials, the system will be shut down and prepared for movement IAW the O&M manual.

## **6.4 Data Requirements**

- Results of post-transportation inspections(s)
- Results of pre-operational checks
- Record of maintenance activities performed (including calibrations)
- Inventory lists
- Shortage lists
- Daily log of actions taken and results achieved
- First aid and injury report(s)
- List of spare parts, expendables, etc., used.

## **6.5 Data Analysis**

Data will be evaluated to determine if the hardware conforms to the contract specifications. Additionally, data will be evaluated to determine if the operators and maintainers can safely operate and maintain the system

## **7. Final Acceptance**

After the successful completion of the government testing (including final data documentation and analysis), the government will provide its final acceptance of the P2U3 unit. For this purpose, the contractor will prepare a DD 250, Material Inspection and Receiving Report, IAW Defense Federal Acquisition Regulations Supplement (DFARS) clause 252.246-7000 and the corresponding DFARS appendix F. The contractor will provide the prepared DD 250 to the authorized government



representative when the P2U3 unit is shipped to APG. The authorized government representative will sign the DD 250 for final acceptance. A copy of the signed DD 250 will be provided to the contractor.

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**APPENDIX A**  
**ACRONYMS/ABBREVIATIONS**

## **APPENDIX A**

### **ACRONYMS/ABBREVIATIONS**

APG	Aberdeen Proving Ground
APG-EA	Aberdeen Proving Ground-Edgewood Area
ASME	American Society of Mechanical Engineers
CSC	conical-shaped charge
DA Pam	Department of the Army Pamphlet
DFARS	Defense Federal Acquisition Regulations Supplement
ECBC	Edgewood Chemical Biological Center
EDS	Explosive Destruction System
EPDM	ethylene propylene diene monomer
FSS	Fragment Suppression System
GB	Sarin
GFE	government-furnished equipment
IAW	in accordance with
kVA	kilovolt-ampere(s)
kW	kilowatt(s)
LSC	linear-shaped charge
MEA	monoethanolamine corrosive
mg/m <sup>3</sup>	milligram per cubic meter

mL	milliliter(s)
mm	millimeter(s)
NEMA	National Electrical Manufacturers Association
NSCMP	Non-Stockpile Chemical Materiel Project
O&M	operation and maintenance
P1	Phase 1
P2	Phase 2
PCA	Physical Configuration Audit
PDTDF	Prototype Detonation Test and Destruction Facility
PMCD	Program Manager for Chemical Demilitarization
PMNSCM	Project Manager for Non-Stockpile Chemical Materiel
psi	pounds per square inch
psig	pounds per square inch gauge
QC	quality control
RDX	cyclonite
SETH	Simulation Equipment Test Hardware
SNL	Sandia National Laboratories
SOP	Standing Operating Procedure
SS	stainless steel
TDP	Technical Data Package
TMDE	test, measurement, and diagnostic equipment
TNT	trinitrotoluene

U1&2	Units 1 and 2
U3	Unit 3
V	volt(s)

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**APPENDIX B**  
**QUALITY CONTROL CHECKLISTS**



## General Electrical Specification

### EDS Electrical Specification

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
1.1	<ul style="list-style-type: none"> <li>Complete installation conforms to the requirements of National Fire Protection Association (NFPA) 70 and NFPA 101, unless more stringent requirements are indicated or shown.</li> </ul>			
1.3	<ul style="list-style-type: none"> <li>Departures from the contract drawings shall be submitted with the detail drawings for approval to Contracting Officer Technical Representative (COTR).</li> </ul>			
1.3.1	<p>As-built drawings shall:</p> <ul style="list-style-type: none"> <li>Include all the information shown on the contract drawings, deviations, modifications, and changes from the contract drawings.</li> <li>Be kept at the job site and updated daily.</li> <li>Be a full-sized set of prints marked to reflect all deviations, changes, and modifications.</li> <li>Be complete and show the location, size, dimensions, part identification, and other information.</li> <li>Be jointly inspected for accuracy and completeness by the contractor's quality control representative and by the COTR prior to the submission of each monthly pay estimate</li> <li>Be marked, and three full-sized sets shall be submitted to the COTR by the contractor for approval.</li> <li>Be returned to the contractor if drawings include errors and/or omissions, and the contractor has 10 calendar days, starting when they receive the drawings, to correct and return the as-built drawings to the COTR for approval.</li> </ul>			

## General Electrical Specification

### EDS Electrical Specification (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
1.3.2	Manufacturer's Catalog composed of catalog cuts, brochures, circulars, specifications, product data, and printed information are in sufficient detail and scope to verify compliance with the requirements of the contract documents.			
1.3.3	Installation procedures for rotating equipment, transformers, switchgear, battery systems, voltage regulators, and grounding resistors shall include diagrams, instructions, and precautions (to install, adjust, calibrate, and test devices and equipment.)			
1.6	Wiring, fixtures, and equipment shall conform to NFPA 70 requirements for installation in damp or wet locations.			

## General Electrical Specification

### EDS Electrical Specification (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
1.7	<ul style="list-style-type: none"> <li>Major items and components of electrical equipment shall be permanently marked with an identification name.</li> <li>Name shall identify the equipment by type of function and specific unit number as indicated.</li> <li>Designation of motor shall coincide with their designation in the motor control center or panel.</li> <li>Nameplates shall be made of laminated plastic in accordance with American Society for Testing and Materials (ASTM) D 709.</li> <li>Nameplate must have black outer layers and a white core.</li> <li>Edges shall be chamfered.</li> <li>Plates shall be fastened with black-finished round-head drive screws, except motors, or approved non-adhesive metal fasteners.</li> <li>Contractor shall ensure the proper installation of the supports and nameplates.</li> <li>The nameplates shall be installed in a conspicuous location.</li> <li>The equipment manufacturer's standard embossed nameplate material with black paint-filled letters may be furnished in lieu of laminated plastic.</li> <li>Front of panel boards motor control center, switchgear, and switchboards shall have a nameplate.</li> <li>Nameplate shall indicate the equipment name, voltage, phase, and maximum amperes.</li> </ul>			

## General Electrical Specification

### EDS Electrical Specification (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
	<ul style="list-style-type: none"> <li>Equipment provided with minimum 1/4-inch high letter name plates:               <ul style="list-style-type: none"> <li>- Panelboards</li> <li>- Transformers</li> <li>- Starters</li> <li>- Safety Switches</li> <li>- Motor Control Centers</li> <li>- Equipment Enclosures</li> <li>- Switchboards</li> <li>- Switchgears</li> <li>- Motors.</li> </ul> </li> <li>Equipment provided with minimum 1/8 in. high letter name plates:               <ul style="list-style-type: none"> <li>- Control Power</li> <li>- Control Devices</li> <li>- Instrument Transformers.</li> </ul> </li> </ul>			
2.1	<ul style="list-style-type: none"> <li>If the Contractor must deviate from the standards designated in these specifications and drawings, he shall, submit a statement of the exact nature of deviations shall be submitted for government approval to the COTR.</li> </ul>			
2.1.1	<ul style="list-style-type: none"> <li>Buses shall be copper.</li> <li>Enclosures shall be stainless steel.</li> <li>Short-circuit ratings shall be in accordance with National Electrical Manufacturers Association (NEMA) BU 1.</li> </ul>			

## General Electrical Specification

### EDS Electrical Specification (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
2.1.2	<ul style="list-style-type: none"> <li>Conductors No. 8 American wire gauge (AWG) and larger diameter shall be stranded.</li> <li>Conductors No. 10 AWG and smaller diameter may be solid with the exception that conductors for remote control, alarm, and signal circuits 1, 2, and 3 shall be stranded unless indicated otherwise.</li> <li>All power and control conductors shall be copper.</li> </ul>			
2.1.2.1	<ul style="list-style-type: none"> <li>Provide copper conductors, splices, and other work to meet equipment manufacturer's requirements.</li> </ul>			
2.1.2.2	Insulation: <ul style="list-style-type: none"> <li>Power wires shall be 600-volt, Type THWN, THHN, or THW conform to Underwriters Laboratories, Inc. (UL) 83.</li> <li>Grounding wire may be type TW conforming to UL 83.</li> <li>Remote control and signal circuits shall be Type TW, THW, or F conforming to UL 83.</li> <li>If lighting fixtures require 90°C conductors, 90°C insulation or better shall be provided.</li> </ul>			
2.1.2.3-11	<ul style="list-style-type: none"> <li>Bonding Conductor, Service Entrance Cables, Non-metallic Sheathed Cable, Metal-Clad Cable, Armored Cable, Mineral-Insulated, Metal-Sheathed Cable, Flat Conductor Cable, Tray Cable or Power Limited Tray Cable, Cord Sets, and Power-supply Cords follow specification.</li> </ul>			

## General Electrical Specification

### EDS Electrical Specification (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
2.1.3	<ul style="list-style-type: none"> <li>Wireways shall be constructed of stainless steel.</li> <li>Wireways shall include metal troughs with hinged covers, gaskets, screws, closure plates, and miscellaneous hardware.</li> <li>Edges, fittings, and hardware must have no burrs and sharp edges.</li> <li>Fittings shall have not less than the load-carrying ability of straight wireways.</li> <li>Fittings must follow manufacturer's minimum standard radius.</li> <li>Dividers shall be installed in wireways that are carrying both power and signal cables.</li> </ul>			
2.1.4.1	<ul style="list-style-type: none"> <li>Molded-case circuit breakers shall conform to NEMA AS 1 and UL 489 and 877.</li> </ul>			
2.1.4.1a	<ul style="list-style-type: none"> <li>Lugs shall be listed for copper and aluminum conductors in accordance with UL 486E.</li> <li>Single-pole circuit breakers shall be full module size with not more than one pole per module.</li> <li>Multi-pole circuit breaker shall be of the common-trip type.</li> <li>All circuit breaker shall have a quick-make, quick-break over center toggle-type mechanism, and the handle mechanism shall be trip free.</li> <li>All circuit breaker handles shall assume a position between "ON" and "OFF" when tripped automatically.</li> <li>All ratings shall be clearly visible.</li> </ul>			

## General Electrical Specification

### EDS Electrical Specification (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
2.1.4.1b	<ul style="list-style-type: none"> <li>Voltage ratings shall be no less than the applicable circuit voltage</li> <li>The interrupting rating of the circuit breakers shall be at least equal to short-circuit current and correspond to the UL listed integrated short-circuit current rating specified for the panel boards and switchboards.</li> <li>Molded-case circuit breakers shall have nominal voltage ratings, maximum continuous-current ratings, and maximum short-circuit interrupting ratings in accordance with NEMA AB 1.</li> <li>Ratings shall be coordinated with systems X/R ratio.</li> </ul>			
2.1.4.1c	<ul style="list-style-type: none"> <li>Circuit breakers used in series combinations shall be in accordance with UL 489</li> <li>Equipment housing series connected circuit breakers shall be clearly marked accordingly</li> <li>Series combinations shall be listed in the UL Recognized Component Directory under "Circuit Breakers Series Connected."</li> </ul>			
2.1.4.1d	<ul style="list-style-type: none"> <li>Automatic operation shall be obtained by means of thermal-magnetic tripping devices.</li> <li>Instantaneous magnetic trip shall be adjustable and accessible from the front of all circuit breakers on frame sizes above 400 amperes.</li> </ul>			

## General Electrical Specification

### EDS Electrical Specification (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
2.1.4.2	<ul style="list-style-type: none"> <li>• All electronics shall be self-contained and require no external relaying power supply or accessories.</li> <li>• Printed circuit cards shall be treated to resist moisture absorption, fungus growth, and signal leakage.</li> <li>• All electronics shall be housed in an enclosure which provides protection against arcs, magnetic interference, dust, and other contaminants.</li> <li>• Solid-state sensing shall measure true RMS current with error less than one percent on systems with distortions through the 13th harmonic.</li> <li>• Current sensors shall be toroidal construction, encased in a plastic housing filled with epoxy to protect against damage and moisture and shall be integrally mounted on the breaker.</li> <li>• Where indicated on drawings, circuit breaker frames shall be rated for 100 percent continuous duty.</li> <li>• Circuit breaker should have tripping features for items shown in specification and drawings.</li> </ul>			
2.1.4.3	<ul style="list-style-type: none"> <li>• Current-limiting circuit breakers shall limit the let-through <math>I^2t</math> to a value less than the <math>I^2t</math> of one-half of the symmetrical short-circuit current wave form.</li> <li>• On fault currents below the threshold of limitation, breakers shall provide conventional overload and short-circuit protection.</li> <li>• Integrally-fused circuit breakers shall not be used.</li> </ul>			



## General Electrical Specification

### EDS Electrical Specification (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
2.1.4.4	<ul style="list-style-type: none"> <li>Low-voltage power circuit breakers shall conform to Institute of Electrical and Electronics Engineers (IEEE) American National Standards Institute (ANSI)/IEEE C37.13, ANSI C37.16, and NEMA SG 3.</li> <li>They shall be three-pole, single throw, stored energy, manually operated, with draw-out mounting.</li> <li>Solid-state trip elements which require no external power connections shall be provided.</li> <li>Circuit breakers shall have an open/close contact position indicator, charged/discharged stored energy indicator, primary disconnect devices, and a mechanical interlock.</li> <li>Control voltage shall not be greater than 120 volts alternating current (VAC) .</li> <li>Voltage ratings shall be not less than the applicable circuit voltage.</li> <li>Circuit breakers shall be rated for 100 percent continuous duty.</li> <li>Shall have trip current ratings and frame sizes as shown in drawings.</li> <li>Ratings shown in specification shall be in accordance with ANSI C37.16.</li> <li>Tripping features shall conform to specification.</li> </ul>			
2.1.4.5	<ul style="list-style-type: none"> <li>Breakers equipped with ground fault circuit interrupters shall have ground fault class, interrupting capacity, and voltage and current rating as indicated on drawings.</li> </ul>			

## General Electrical Specification

### EDS Electrical Specification (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
2.1.5	<ul style="list-style-type: none"> <li>Motor short-circuit protectors shall conform to UL 508.</li> <li>Protectors shall be used only as part of a combination motor controller.</li> <li>Protector shall be rated in accordance with the requirements of NFPA 70.</li> </ul>			
2.1.5.1	<ul style="list-style-type: none"> <li>Motor short-circuit protector (MSCP) bodies shall be constructed of high temperature, dimensionally stable, long life, non-hydroscopic materials.</li> <li>Protectors shall fit special MSCP mounting clips.</li> <li>Shall not be interchangeable with any commercially available fuses.</li> <li>Protectors shall have 100 percent one-way interchangeability within the A-Y letter designations.</li> <li>All ratings shall be clearly visible.</li> </ul>			
2.1.5.2	<ul style="list-style-type: none"> <li>Voltage ratings shall not be less than the applicable circuit voltage</li> <li>Letter designations shall be A through Y for motor controller sizes 0, 1, 2, 3, 4, and 5, with 1000,000 amperes interrupting capacity rating</li> <li>Letter designation shall correspond to controller sizes and MSCP designations shown in specification.</li> </ul>			
2.1.6	<ul style="list-style-type: none"> <li>Conduit and tubing shall conform to specification.</li> </ul>			
2.1.7	<ul style="list-style-type: none"> <li>Conduit and Device Boxes and Fitting shall conform to specification.</li> </ul>			

## General Electrical Specification

### EDS Electrical Specification (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
2.1.8	<ul style="list-style-type: none"> <li>Connectors, Wire Pressure shall conform to specification.</li> </ul>			
2.1.9	<ul style="list-style-type: none"> <li>Electrical Groundings and Bonding Equipment shall conform to specification.</li> </ul>			
2.1.10	<ul style="list-style-type: none"> <li>Enclosures shall conform to specification.</li> </ul>			
2.1.11	<ul style="list-style-type: none"> <li>Low-Voltage Fuses and Fuseholders shall conform to specification.</li> </ul>			
2.1.12	<ul style="list-style-type: none"> <li>Instruments, Electrical Indicating shall conform to specification.</li> </ul>			
2.1.13	<ul style="list-style-type: none"> <li>Motors, AC, fractional and integral horsepower, 500 hp, and smaller shall conform to NEMA MG 1 and UL 1004; energy management selection poly-phase motors shall conform to NEMA MG 10; and motors used in hazardous (classified) location shall conform to UL 674.</li> </ul>			
2.1.13.1	<ul style="list-style-type: none"> <li>The horsepower rating of motors should be limited to no more than 125 percent of the maximum load being served.</li> <li>If the horsepower does exceed 125 percent, refer to the specification.</li> </ul>			

## General Electrical Specification

### EDS Electrical Specification (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
2.1.13.2	<ul style="list-style-type: none"> <li>All permanently wired poly-phase motors of 1 hp or more shall meet the minimum full-load efficiencies as indicated in specification.</li> <li>Motors of 1 hp or more with open, drip proof, or totally enclosed fan-cooled enclosures shall be high-efficiency type, unless otherwise indicated</li> <li>Motors provided as an integral part of motor-driven equipment are excluded if a minimum seasonal or overall efficiency requirement is indicated in provisions of another section.</li> </ul>			
2.1.14	<ul style="list-style-type: none"> <li>For each motor, vendor shall supply the data that is listed in the specification.</li> </ul>			
2.1.15	<ul style="list-style-type: none"> <li>Panelboards shall be dead-front construction conforming to NEMA PB 1 and UL 67.</li> <li>Manufacture of panelboard shall be the same for the major components within the assembly.</li> <li>Equipment and major components shall be suitable for and certified to meet all applicable seismic requirements of uniform building code (UBC) for zone 4 application.</li> </ul>			

## General Electrical Specification

### EDS Electrical Specification (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
2.1.15.1	<ul style="list-style-type: none"> <li>• Interior shall be completely factory assembled devices.</li> <li>• Switching and protective devices can be replaced without disturbing adjacent units and without removing the main bus connectors.</li> <li>• Distribution panelboard trims shall cover all live parts except switching.</li> <li>• Trim for branch circuit panelboards shall be supplied with a hinged door over all circuit breaker handles.</li> <li>• Surface trims shall be same height and width as box.</li> <li>• Flush trims shall overlap the box by 3/4 of an inch on all sides.</li> <li>• A directory card with a clear plastic cover shall be supplied and mounted on the inside of each door.</li> </ul>			

## General Electrical Specification

### EDS Electrical Specification (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
2.1.15.2	<ul style="list-style-type: none"> <li>• Main bus bars shall be copper sized in accordance with UL standards to limit temperature .</li> <li>• A system and ground bus shall be included in all panels.</li> <li>• Full-size 100 percent rated insulated neutral bars shall be included for panelboards shown with neutral.</li> <li>• Bus bars taps for panels with single-pole branches shall be arranged for sequence phasing of the branch circuit devices.</li> <li>• Neutral busing shall have a suitable lug for each outgoing feeder requiring a neutral connection.</li> <li>• Two-hundred percent–rated neutrals shall be supplied for panels designated on drawings with oversized neutral conductors.</li> </ul>			
2.1.15.3	<ul style="list-style-type: none"> <li>• Panelboards rated 240 VAC or less shall have short-circuit ratings but not less than 10,000 amperes RMS symmetrical.</li> <li>• Panelboards rated 480 VAC shall have short-circuit ratings, but not less than 14,000 amperes RMS symmetrical.</li> <li>• Panelboards shall be labeled with UL short-circuit rating.</li> <li>• It shall state the conditions of the UL series ratings refer to specification.</li> </ul>			

## General Electrical Specification

### EDS Electrical Specification (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
2.1.16	<ul style="list-style-type: none"> <li>Devices shall conform to all requirements for heavy duty receptacles in accordance with NEMA WD 1.</li> <li>Standard Grade shall conform to UL 498.</li> <li>Ground Fault Interrupters shall conform to UL 943, Class A or B.</li> <li>NEMA Standard Receptacle Configurations refer to specification.</li> </ul>			
2.1.17	<ul style="list-style-type: none"> <li>Service entrance Equipment shall conform to UL 869A.</li> </ul>			
2.1.17.1	<ul style="list-style-type: none"> <li>Splice Conductor shall conform to UL 486C.</li> </ul>			
2.1.18	<ul style="list-style-type: none"> <li>Snap Switches shall conform to UL 20.</li> </ul>			
2.1.19.1	<ul style="list-style-type: none"> <li>Plastic Tape shall conform to UL 510.</li> </ul>			
2.1.19.2	<ul style="list-style-type: none"> <li>Rubber Tape shall conform to UL 510.</li> </ul>			
2.1.20.1	<ul style="list-style-type: none"> <li>Dry-type Resin Encapsulated Transformers shall be listed by UL and conform to the requirements of ANSI/NFPA 70.</li> <li>Single and three-phase transformers shall have two windings per phase.</li> <li>Full-capacity standard NEMA taps shall be provided in the primary winding of transformers.</li> <li>Three-phase transformers shall be configured with delta-wye windings.</li> <li>Transformers supplying non-linear loads shall be UL listed as suitable for supplying such loads with a total K-factor not to exceed K-9, and have neutrals sized for 200 percent of rated current.</li> </ul>			

## General Electrical Specification

### EDS Electrical Specification (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
2.1.20.2	<ul style="list-style-type: none"> <li>All cores to be constructed of high grade, non-aging silicon steel with high magnetic permeability and low hysteresis and eddy current losses.</li> <li>Magnetic flux densities shall be below the saturation point.</li> <li>Terminations shall consist of wire leads with minimum insulation rating of 125°C.</li> </ul>			
2.1.20.3	<ul style="list-style-type: none"> <li>All insulating material are to exceed NEMA ST 20 standards and be rated for 180°C UL component recognized insulation system.</li> <li>Transformer(s) shall have 180°C insulation system with temperature rise not exceeding 115°C under full-rated load in maximum ambient temperature of 40°C.</li> <li>Transformer of 115°C temperature rise shall be capable of carrying continuously 115 percent of nameplate kVA without exceeding insulation rating.</li> <li>The transformer(s) shall be rated as indicated in the specification.</li> <li>Transformers shall be quiet type with maximum sound level at least 3 decibels less than NEMA standard level for transformer ratings indicated.</li> </ul>			
2.1.21.1	<ul style="list-style-type: none"> <li>Instrument transformers shall comply with ANSI C12.11 and IEEE ANSI/IEEE C57.13.</li> <li>Polarity marks on instrument transformers shall be visually evident.</li> </ul>			



## General Electrical Specification

### EDS Electrical Specification (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
2.1.21.2	<ul style="list-style-type: none"> <li>Transformers shall have a BIL rating consistent with the rated BIL of the associated switchgear or electric power apparatus bushings, buses or conductors.</li> <li>Current transformers shall have the indicated ratios.</li> <li>Thermal and mechanical ratings of current transformers and their primary leads not less than the momentary ratings of the associated circuit breaker.</li> <li>Circuit protectors shall be provided across secondary leads of the current transformers.</li> <li>Each terminal of each current transformer shall be connected to a short-circuiting terminal block in the circuit interrupting mechanism cabinet, power transformer terminal cabinet, and in associated instrument and relay cabinets.</li> </ul>			
2.1.22	<ul style="list-style-type: none"> <li>Wiring devices shall conform to NEMA WS 1 and to NEMA WD 6 for dimensional requirements.</li> </ul>			
2.1.23	<ul style="list-style-type: none"> <li>Power supplies shall be in accordance with UL 508.</li> </ul>			
2.1.24	<ul style="list-style-type: none"> <li>Power conditioners shall have insulation resistance of 100 megohms from winding to core measured at 500 VDC.</li> <li>Power conditioners shall have an input/output voltage ranger of -25 to +15 percent of normal rated voltage and an efficiency of approximately 96 percent.</li> </ul>			

## General Electrical Specification

### EDS Electrical Specification (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
3.1	<ul style="list-style-type: none"> <li>Installation shall conform to NFPA 70 and NFPA 101 as a minimum.</li> </ul>			
3.3	<ul style="list-style-type: none"> <li>Grounding shall be in conformance with NFPA 70, drawings, and the following specifications:</li> </ul>			
3.3.1	<ul style="list-style-type: none"> <li>Non-current-carrying metal parts of electrical equipment shall be grounded by bonding to the ground bus.</li> <li>The ground bus shall be bonded to the entrance ground.</li> <li>Connections and splices shall be of the brazed, welded, bolted, or pressured-connections type, except that pressure connectors or bolted connections to removable equipment.</li> <li>Connections shall be bolted type in lieu of thermowelding.</li> </ul>			
3.3.2	<ul style="list-style-type: none"> <li>A green equipment grounding conductor sized in accordance with NFPA 70 shall be provided.</li> <li>Equipment grounding bars shall be provided in all panel boards.</li> <li>The equipment grounding conductor shall be carried back to the service entrance grounding connection or separately derived grounding connection.</li> <li>All equipment ground conductors shall be bonded or joined together in each wiring box or equipment enclosure.</li> <li>Metallic boxes and enclosures shall also be bonded to there grounding conductors by an approved means per NFPA 70.</li> </ul>			

## General Electrical Specification

### EDS Electrical Specification (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
3.4	<ul style="list-style-type: none"> <li>Wiring shall conform to NFPA 70, drawings and specifications.</li> <li>Wiring shall consist of insulated conductors installed in rigid zinc-coated steel conduit.</li> <li>Cables and wires installed in cable trays shall be type permitted by NFPA 70</li> </ul>			
3.4.1	<ul style="list-style-type: none"> <li>Minimum size of raceways shall be 1/2-inch.</li> <li>Only metal conduits shall be permitted when conduits are required for shielding unless other is required by conformance to NFPA 70.</li> <li>Flexible metal conduit and flexible nonmetallic tubing shall have plastic grommet for armor</li> <li>Non-metallic conduit and tubing may be used in damp, wet, or corrosive locations when permitted by NFPA 70, and the conduit or tubing system is provided with appropriate boxes, covers, clamps, screws, or other appropriate type fittings.</li> <li>Bushings, manufactured fittings, or boxes shall be installed on the ends of all conduits and shall be of the insulating type required by NFPA 70.</li> </ul>			
3.4.1.1	<ul style="list-style-type: none"> <li>A pull wire shall be inserted in each empty raceway in which wiring is more than 50 feet in length and contains more than the equivalent of two 90° bends, or where the raceway is more than 150 feet in length.</li> <li>The pull wire shall be of No. 14 AWG zinc-coated steel, or of plastic having not less than 200 pounds per square inch tensile strength.</li> <li>Not less than 10 inches of slack shall be left at each end of the pull wire.</li> </ul>			

## General Electrical Specification

### EDS Electrical Specification (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
3.4.1.2	<ul style="list-style-type: none"><li>• Conduits stubbed up through the trailer floor shall have a short elbow installed below floor level to transition from a horizontal run to a vertical run.</li><li>• A conduit coupling fitting threaded on the inside shall be installed to allow terminating the conduit flush with the finished floor</li><li>• Wiring shall be extended in rigid threaded conduit to equipment, except that where required flexible conduit may be used 6 inches above the floor.</li><li>• Empty or spared conduit stub-ups shall be plugged flush with threaded, recessed plug.</li></ul>			
3.4.1.3	<ul style="list-style-type: none"><li>• Changes in direction of runs shall be made with symmetrical bends or stainless steel fittings.</li><li>• Crushed or deformed raceways shall not be installed.</li><li>• Clogged raceways shall be cleared of obstruction or replaced.</li></ul>			

## General Electrical Specification

### EDS Electrical Specification (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
3.4.1.4	<ul style="list-style-type: none"> <li>• Metallic conduits and tubing and the support system shall be securely and rigidly fasted in place in intervals of no more than 10 feet and within 3 feet of boxes, cabinets, and fittings, with approved pipe straps, wall brackets, conduit clamps, conduit hangers, threaded C-clamps, beam clamps, or ceiling trapeze.</li> <li>• Loads and supports shall be coordinated with supporting structure.</li> <li>• Raceways or pipe straps shall not be welded to steel structures, shall not be supported by wire or nylon ties, and independently supported from the structure.</li> <li>• Supporting means shall not be shared.</li> <li>• Conduits shall be fastened to sheet-metal boxes and cabinets with two locknuts, where required, by NFPA 70.</li> </ul>			
3.4.2	<ul style="list-style-type: none"> <li>• Wireways shall be supported in accordance with the manufacture but no more than 6-foot intervals.</li> <li>• Adjacent wireway sections shall be bonded together by connector plates of an identical type as the cable tray section.</li> <li>• Wireways system manufacture's certification shall state that the requirements of Article 318 of NFPA 70 are met.</li> <li>• The wireway shall be installed and grounded in accordance with the provisions of Article 318 of NFPA 70.</li> </ul>			
3.4.3	<ul style="list-style-type: none"> <li>• Cables and conductors Installation shall conform to the requirements of NFPA 70.</li> </ul>			

## General Electrical Specification

### EDS Electrical Specification (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
3.4.3.1	<ul style="list-style-type: none"> <li>Sizes shall be not less than indicated.</li> <li>Branch-circuit conductors shall be no smaller than No. 12 AWG.</li> <li>Class 3 low-energy, remote-control, and signal circuits shall be not less than No. 2 AWG.</li> </ul>			
3.4.3.2	<ul style="list-style-type: none"> <li>Aluminum conductors shall not be used.</li> </ul>			
3.4.3.3	<ul style="list-style-type: none"> <li>Exposed nonmetallic-sheathed cables less than 4 feet above floors shall be protected in conduit or tubing.</li> </ul>			
3.4.3.4	<ul style="list-style-type: none"> <li>Copper conductors, 600 Volts and under: Splices in conductors No. 10 AWG and smaller diameter shall be made with an insulated, pressure-type connector.</li> <li>Splices in conductors No. 8 AWG and larger diameter shall be made with a solderless connector and insulated with tape or heat-shrink type insulating material equivalent to the conductor insulation.</li> </ul>			
3.4.3.5	<ul style="list-style-type: none"> <li>Power, control, and signal circuit conductor identification shall be provided within each enclosure where a tap, splice, or termination is made.</li> <li>Where several feeders pass through a common pull box, the feeders shall be tagged to indicate clearly the electrical characteristics, circuit number, and panel designation.</li> <li>Phase conductors of low voltage power circuits shall be identified by color coding.</li> <li>Refer to specification for color code.</li> </ul>			

## General Electrical Specification

### EDS Electrical Specification (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
3.5	<ul style="list-style-type: none"> <li>Boxes in wiring or raceway systems shall be provided where required by NFPA 70.</li> <li>Pull boxes shall be furnished with screw-fastened covers.</li> <li>Box volume shall be in accordance with NFPA 70 for number of conductors enclosed in box.</li> <li>Boxes for metallic raceways, 4x4-inch nominal size and smaller, shall be cast-metal hub type when mounted in wet locations, or flush and surface mounted on exterior surfaces, or located in hazardous areas.</li> <li>Stainless steel boxes in wet locations and boxes installed on outside of exterior surfaces shall be gasketed.</li> <li>Large size boxes shall comply with NEMA 4x or shown on drawings.</li> </ul>			
3.6	<ul style="list-style-type: none"> <li>One-piece type device plates shall be provided for all outlets and fittings.</li> <li>Plates installed in wet locations shall be gasketed and have a hinged, gasketed cover.</li> </ul>			

## General Electrical Specification

### EDS Electrical Specification (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
3.7.1	<ul style="list-style-type: none"> <li>Single and duplex receptacles shall be rated 15 amperes, 120 volts, two-pole, three-wire, grounded type with polarized parallel slots.</li> <li>Bodies shall be white and supported by mounting strap with plaster ears.</li> <li>Contact arrangement shall be made on two sides of an inserted blade.</li> <li>Receptacle shall be side or back wired with two screws per terminal.</li> <li>Third grounding pole shall be connected to the metal mounting yoke.</li> <li>Switched receptacles shall be the same as other specified receptacles except that the ungrounded pole shall be provided with a separate terminal.</li> <li>Only the top receptacle of a duplex receptacle shall be wired for switching application.</li> <li>Receptacles with ground fault circuit interrupters shall have current rating indicated and be UL Class A type.</li> <li>Ground fault circuit protection shall conform to NFPA 70 and to drawings.</li> </ul>			
3.7.2	<ul style="list-style-type: none"> <li>Weatherproof receptacles shall be suitable for damp or wet environment.</li> <li>Housing shall be labeled for allowable use.</li> <li>Receptacles shall be marked in accordance with UL 514A for type of use.</li> </ul>			



## General Electrical Specification

### EDS Electrical Specification (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
3.7.2.1	<ul style="list-style-type: none"> <li>Receptacles in damp locations shall be mounted in an outlet box with a gasketed, weatherproof, receptacle opening.</li> <li>Cap shall be either screw-on type permanently attached to the cover plate, or shall be a flat type attached to the cover with spring loaded hinge.</li> </ul>			
3.7.2.2	<ul style="list-style-type: none"> <li>Receptacles in wet locations shall be installed in an assembly rated for such use whether the plug is inserted or withdrawn.</li> <li>In duplex installation the receptacle cover shall shield the connections whether one or both receptacles are in use.</li> </ul>			
3.7.3	<ul style="list-style-type: none"> <li>Contact surfaces of special-purpose or heavy-duty receptacles may be either round or rectangular.</li> <li>One appropriate straight or angle-type plug shall be furnished with each receptacle.</li> <li>Locking type receptacles, rated 30 amperes or less shall be locked by rotating the plug.</li> <li>Lock type receptacles, rated more than 50 amperes shall utilize a locking ring.</li> </ul>			
3.8	<ul style="list-style-type: none"> <li>Service-disconnecting means shall be of the fusible safety switch type with an external handle for manual operation.</li> <li>Enclosures shall be sheet metal with hinged cover for surface mounting unless otherwise indicated.</li> </ul>			

## General Electrical Specification

### EDS Electrical Specification (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
3.9	<ul style="list-style-type: none"> <li>• Circuit breakers and switches used as a motor disconnecting means shall be capable of being locked in the open position.</li> <li>• Door locks shall be keyed alike.</li> <li>• Directories shall be typed to indicate loads served by each circuit and mounted in a holder behind clear protective covering.</li> <li>• Buses shall be copper.</li> </ul>			
3.9.1	<ul style="list-style-type: none"> <li>• Panelboards shall be circuit breaker type as indicated on drawings.</li> </ul>			
3.9.2	<ul style="list-style-type: none"> <li>• Load centers shall be circuit breaker equipped.</li> </ul>			
3.10	<ul style="list-style-type: none"> <li>• A complete set of properly rated fuses for equipment shall be provided.</li> <li>• Required current-limiting fuses shall be provided.</li> <li>• Fuses shall have a voltage rating of no less than the phase-to-phase circuit voltage, and shall have the time-current characteristics required for effective power system coordination.</li> <li>• Time-delay and non-time-delay options shall be specified.</li> </ul>			
3.10.1	<ul style="list-style-type: none"> <li>• Non-current-limiting type cartridge fuses shall be Class H nonrenewable, dual element, time lag type.</li> <li>• Shall have interrupting capacity of 10,000 amperes.</li> <li>• At 500 percent current, cartridge fuses shall not blow in less than 10 seconds.</li> </ul>			

## General Electrical Specification

### EDS Electrical Specification (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
3.10.2	<ul style="list-style-type: none"> <li>Cartridge fuses, current-limiting type, Class J shall have tested interrupting capacity not less than 100,000 amperes.</li> <li>Fuse holders shall reject all Class H fuses.</li> </ul>			
3.10.3	<ul style="list-style-type: none"> <li>Service entrance and feeder circuit fuses (600 amperes and smaller) shall be Class J, current-limiting, time-delay with 200,000 amperes interrupting capacity or as indicated on drawings.</li> </ul>			
3.10.4	<ul style="list-style-type: none"> <li>Motor, motor controller, transformer, and inductive circuit fuses shall be Class RK1 or RK5, current-limiting, time-delay with 2000,000 amperes interrupting capacity, or as indicated on drawings.</li> </ul>			
3.11	<ul style="list-style-type: none"> <li>Each motor shall be provided with a disconnecting means when required by NFPA 70.</li> <li>For single-phase motors, a single or double pole toggle switch, rated only for alternating current, shall be acceptable for capacities less than 30 amperes, provided the ampere rating of the switch is at least 125 percent of the motor rating.</li> <li>Switches shall disconnect all ungrounded conductors.</li> </ul>			
3.12	<ul style="list-style-type: none"> <li>Transformers shall be installed in conformance with NFPA 70 (2005) National Electrical Code.</li> </ul>			
3.13	<ul style="list-style-type: none"> <li>Battery chargers shall be installed in conformance with NFPA 70.</li> </ul>			

## General Electrical Specification

### EDS Electrical Specification (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
3.14	<ul style="list-style-type: none"> <li>Equipment connections shall comply with the applicable requirements of "Wiring Methods."</li> <li>Flexible conduits 6 feet or less in length shall be provided to all electrical equipment subject to periodic removal, vibration, or movement and for all motors.</li> <li>All motors shall be provided with separate grounding conductors.</li> <li>Liquid-tight conduits shall be provided in damp or wet locations.</li> </ul>			
3.15	<ul style="list-style-type: none"> <li>Motors, motor controls, and motor control centers shall be installed in accordance with NFPA 70, the manufacturer's recommendations, and as indicated.</li> <li>Wiring shall be extended to motors, motor controls, and motor control centers and terminated.</li> </ul>			
3.16	<ul style="list-style-type: none"> <li>Wiring shall be extended to the government-furnished equipment and terminated.</li> </ul>			
3.17	<ul style="list-style-type: none"> <li>The contractor shall calibrate, adjust, set, and test each new adjustable circuit protective device prior to the initial energization of the new power system under actual operating conditions.</li> </ul>			

Note:

<sup>a</sup> Checklist based on Section 01100 General Electrical Specification dated 08/01/2006.

## General Instrumentation Specification

### EDS Instrumentation Specification

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
1.3.1	<ul style="list-style-type: none"> <li>Contractor shall submit three copies of any "AS BUILT " installations drawings that differ from the supplied set of design drawings.</li> <li>Drawings shall be record of work as actually constructed.</li> <li>A copy of applicable schematics and diagrams, different from the design drawings or not, shall be placed in each panel in a protective envelope or binder.</li> </ul>			
1.3.2	<ul style="list-style-type: none"> <li>Contractor shall submit for approval not later than 15 days prior to the test demonstration.</li> <li>The plan shall include procedures to be used in final operation testing of entire system, description of each system of test methods and materials, testing instruments and recorders, a list of the equipment involved with the functional parameters to be recorded on each item, and shop drawings of required temporary bypasses and like facilities.</li> <li>Contractor shall submit three copies of test results and records for all final operation tests.</li> </ul>			

## General Instrumentation Specification

### EDS Instrumentation Specification (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
1.3.3	<ul style="list-style-type: none"> <li>The control and instrumentation contractor, or authorized representative, shall submit a certified report for each panel and any associated field instruments certifying that the equipment (1) had been properly installed under his supervision, (2) is in accurate calibration, (3) was placed in operation in his presence, (4) has been checked, inspected, calibrated, and adjusted as necessary, (5) has been operated satisfactorily, and (6) is fully covered under the terms of the guarantee.</li> </ul>			

## General Instrumentation Specification

### EDS Instrumentation Specification (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
1.3.4	<ul style="list-style-type: none"> <li>Contractor shall furnish two sets of Instruction Manuals and Part Lists for control and instrumentation equipment provided under the control and instrumentation sections.</li> <li>Contractor shall bind each manual in a cover, which indicates the systems name, manufacturer's name, local address and telephone number, and year of purchase.</li> <li>Contractor shall punch and bind manuals in standard three ring binders and include system name and control and instrumentation contractor's name on binding.</li> </ul>			

## General Instrumentation Specification

### EDS Instrumentation Specification (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
1.4	<ul style="list-style-type: none"> <li>• All equipment furnished shall be new and of current design.</li> <li>• Materials and Installation shall comply with the requirements of the current editions of referenced electrical codes and standards.</li> <li>• Codes and standards referred to shall be used for establishing the minimum quality of the materials and equipment supplied and installed.</li> <li>• All equipment of the same type shall be products of the same manufacturer.</li> <li>• Capacities of all equipment shall not be less than that indicated on the drawings or specified.</li> <li>• Control and instrumentation contractor shall inspect each instrument and piece of equipment for damage, defects, completeness, and correct operation before installing.</li> <li>• Contractor shall be responsible for verifying correct range, span, and accuracy of all instrumentation upon receipt.</li> </ul>			



## General Instrumentation Specification

### EDS Instrumentation Specification (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
	<ul style="list-style-type: none"> <li>Control and instrumentation contractor shall provide the service of trained and experienced instrumentation technicians, tools, and equipment to field calibrate each instrument to its specified accuracy.</li> <li>Calibrated test shall have accuracies traceable to the National Bureau of Standards.</li> <li>Contractor shall provide a list and basic specifications for instruments used.</li> <li>A written report shall be submitted certifying that each instrument has been calibrated to its published specified accuracy specified in the specification.</li> <li>Data shall be recorded on prepared forms and shall include not less than the items found in specification.</li> </ul>			
1.5.1	<ul style="list-style-type: none"> <li>Contractor shall guarantee all work of the control and instrumentation sections.</li> </ul>			

## General Instrumentation Specification

### EDS Instrumentation Specification (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
2.1	<ul style="list-style-type: none"> <li>Control and instrumentation contractor shall provide instruments, equipment, and materials suitable for service conditions and meeting standards of ANSI, ASTM, ISA, and SAMA.</li> <li>All instruments in the EDS, supplied by the control and instrumentation contractor, of the same type shall be by the same manufacturer.</li> </ul>			
2.3	<ul style="list-style-type: none"> <li>All equipment shall be rated for normal operating performance with varying storage conditions over the minimum ranges found in specification.</li> <li>Contractor shall box, crate, or otherwise enclose and protect instruments and equipment during shipment handling and storage.</li> <li>Contractor shall keep all equipment dry and covered from exposure of elements, which could degrade the equipment.</li> <li>Contractor shall protect painted surfaces against impact, abrasion, discoloration, and other damage.</li> <li>Contractor shall repair any damage as directed and approved.</li> </ul>			

## General Instrumentation Specification

### EDS Instrumentation Specification (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
3.1	<ul style="list-style-type: none"><li>Contractor shall conform to drawings as closely as possible and exercise care.</li><li>Contractor shall confirm all dimensions and mountings and connection arrangements are in accordance with the drawings set provided with this package.</li></ul>			

Notes:

<sup>a</sup> Checklist base on Section 01200 General Instrumentation Specification, dated 08/01/2006.

ANSI = American National Standards Institute  
ASTM = American Society for Testing and Materials  
EDS = Explosive Destruction System  
ISA = International Society for Measurement and Control  
SAMA = Scientific Apparatus Makers Association

## General Mechanical Specification

### EDS General Mechanical Specification

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
2.2	<ul style="list-style-type: none"> <li>All stainless steel (SS) components located above the trailer deck shall be fabricated from 304 SS per ASTM A167.</li> <li>Stainless steel welding shall be in accordance with AWS D1.6.</li> <li>Welds shall be full penetration, continuous, and ground smooth to prevent entrapment of liquids.</li> </ul>			
2.3	<ul style="list-style-type: none"> <li>Blanket insulation shall be Alpha Temp-Mat, 1-inch thick, E-glass needled fiberglass, 11 lb/ft cubed density, and shall be designed for service temperatures up to 1,200° F.</li> <li>Insulation shall conform to the requirements of Military Specification MIL-I-16411 type II and Coast Guard Specification for Incombustible Materials No. 164.009 and Mil-I-24244.</li> <li>Insulation shall be installed in accordance with the manufacturer's instructions and engineering drawings.</li> </ul>			

## General Mechanical Specification

### EDS General Mechanical Specification (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
2.4	<ul style="list-style-type: none"> <li>Grade 8 hex head bolts shall comply with ANSI/ASME B18.2.1. Grade 8 bolts in the rotation subsystem, which hold the vessel support casters, motor mount, and safety ring trailer support, shall have a cadmium finish in accordance with ASTM B766 type II for corrosion resistance.</li> <li>Carbon alloy steel lock washers for use with grade 8 hex head bolts shall comply with ASME B18.21.1 and shall have a cadmium finish in accordance with ASTM B766 type II for corrosion resistance.</li> <li>Carbon alloy steel flat washers for use with grade 8 hex head bolts shall comply with ASTM F436 and shall have a cadmium finish in accordance with ASTM B766 type II for corrosion resistance.</li> <li>Grade 8 medium carbon steel hex nuts shall comply with ANSI/ASME B18.2.2 and shall have a cadmium finish in accordance with ASTM B766 type II for corrosion resistance.</li> <li>Stainless steel bolts shall be 304 SS in accordance with ASTM F 593. Anti-seize lubricant shall be applied to the threads of all SS fasteners prior to assembly. Teflon tape shall be used on all pipe threads National Pipe Thread (NPT).</li> <li>SS nuts shall be 304 SS in accordance with ASTM F 594. SS washers shall be 304 SS.</li> </ul>			

## General Mechanical Specification

### EDS General Mechanical Specification (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
3.1	<ul style="list-style-type: none"> <li>When a deviation from the standards designated in the specifications and drawings is required, the proposed specifications for materials and equipment must have government approval from the Contracting Officer Technical Representative (COTR). Deviation requests must be submitted prior to making any changes.</li> </ul>			
3.2	<ul style="list-style-type: none"> <li>Mechanical equipment shall be installed in accordance with the manufacturer's instructions and engineering drawings.</li> <li>All mechanical components shall be lubricated prior to operation in accordance with the manufacturer's recommendation of lubrication type, quantity, and guidelines.</li> </ul>			

Notes:

<sup>a</sup> Checklist based on Section 01300 General Mechanical Specification dated 08/01/2006.

ANSI = American National Standards Institute  
ASME = American Society of Mechanical Engineers  
ASTM = American Society for Testing and Materials  
AWS = American Welding Society

## General Piping Specification

### EDS Piping Specification

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
2.1	<ul style="list-style-type: none"> <li>The supplied compression type fitting shall be Swagelok or a government approved equal.</li> <li>The fittings shall be standardized to one manufacturer rather than assembly of fittings from several manufacturers.</li> </ul>			
2.2	<ul style="list-style-type: none"> <li>All furnished materials and equipment shall be delivered as new clean, undamaged, and in workable condition.</li> <li>Materials shall be inspected and cleaned prior to storage or final assembly.</li> <li>Pipe spool openings shall be covered, capped, or plugged during storage.</li> <li>Tape alone shall not be used for sealing openings.</li> <li>Pressure-sensitive tape shall be utilized for taping covered, capping, or plugged openings.</li> <li>Closures shall not be made of polyvinyl chloride (PVC) or other plastics that contain chloride.</li> <li>Piping materials and prefabricated assemblies shall be stored under cover and out of contact with the ground.</li> <li>End seals of tubing, valve covers, and similar protection shall not be removed until necessary for cleaning, fabrication, inspection, and assembly.</li> <li>Austenitic stainless steel materials shall be stored separately from carbon steel materials.</li> <li>End seals or covers shall be reinstalled on partially assembled subsystems.</li> </ul>			

## General Piping Specification

### EDS Piping Specification (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specification	Comments	Initials
	<ul style="list-style-type: none"> <li>• Tubing shall be stored off the ground with, as a minimum, wooden spacer blocks.</li> <li>• Tubing must be inspected upon delivery for outer diameter (OD) gouges and must be stored and handled to prevent gouges or scratches on the exterior.</li> <li>• Bent tubing may not be straightened by stretching and rolling.</li> </ul>			
3.2	<ul style="list-style-type: none"> <li>• Fabrication of tubing shall be in accordance with ASME B31.3.</li> <li>• Tube ends shall be cut square, reamed, and deburred such that the end rests firmly on the shoulder of the fitting.</li> <li>• Form tubing by cold bending only.</li> <li>• Minimum bend radius shall be three times the tubing diameter.</li> <li>• Bends shall be free from cracks, buckles, wrinkles, bulges, and grooves.</li> <li>• Hot bending shall not be performed.</li> <li>• Shop fabricated tubing tolerance shall be <math>\pm 1/16</math> inch maximum on overall dimensions.</li> </ul>			



## General Piping Specification

### EDS Piping Specification (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specification	Comments	Initials
3.3	<ul style="list-style-type: none"> <li>Threaded fittings shall be installed in accordance with ASME B31.3.</li> <li>All pipe threads shall be National Pipe Thread (NPT) standard.</li> <li>Threads shall be clean and free of defects prior to installation.</li> <li>Only Teflon<sup>®</sup> tape shall be used as a thread sealant.</li> <li>Tape shall not be applied to the first two threads on a fitting.</li> </ul>			
3.4	<ul style="list-style-type: none"> <li>All flex hose assemblies shall be supplied with 316 stainless steel end fittings.</li> <li>All end fittings shall be crimped to the hose using crimp designs ensuring that the end fitting blow-off pressure shall meet or exceed the hose burst pressure.</li> <li>Threaded connectors shall be standard NPT sizes.</li> </ul>			
3.5	<ul style="list-style-type: none"> <li>Assembled piping systems shall be pressure-tested in accordance with the applicable codes.</li> <li>Care shall be taken to isolate the subsystems or lines to prevent damage to other lines and equipment in the systems due to overpressure.</li> </ul>			

Notes:

<sup>a</sup> Checklist based on Section 01400 General Piping Specification dated 08/01/2006.

ASME = American Society of Mechanical Engineers

## General Structural and Welding Specification

### EDS Structural and Welding Specification

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
1.3	<ul style="list-style-type: none"> <li>The design of welded connections shall conform to AISC unless otherwise indicated or specified.</li> <li>Material with welds shall not be accepted unless the welding is specified or indicated on the drawings or otherwise approved.</li> <li>Qualifications testing shall be performed at or near the work site.</li> <li>Each contractor performing welding shall maintain records of the test results obtained in welding procedure, welder, welding operator, and tackler performance qualifications.</li> </ul>			
1.4.1	<ul style="list-style-type: none"> <li>Owner approval is required for submittals found in specifications.</li> </ul>			
1.5	<ul style="list-style-type: none"> <li>Copies of the welding procedure specification and the results of the procedure qualification test shall be submitted for approval.</li> <li>This information shall be submitted on the forms in appendix E of AWS D1.1.</li> <li>Welding procedure specifications shall be individually identified and referenced on the detail drawings and erection drawings or shall be suitable keyed to the contract drawings.</li> </ul>			
1.5.1	<ul style="list-style-type: none"> <li>Welding procedures previously qualified by test may be accepted for this contract without prequalification conditions being met. These conditions are found in specification.</li> </ul>			

## General Structural and Welding Specification

### EDS Structural and Welding Specification (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
1.5.2	<ul style="list-style-type: none"> <li>The contractor shall submit for approval a listing or an annotated drawing to indicate the joints not prequalified.</li> <li>Procedure qualification shall be required for these joints.</li> </ul>			
1.5.3	<ul style="list-style-type: none"> <li>If the welding procedure is qualified through retesting, all test results, including those of test welds that failed to meet the requirements, shall be submitted with the welding procedure.</li> </ul>			
1.6	<ul style="list-style-type: none"> <li>Each welder, welding operator, and tacker assigned to work on this contract shall be qualified in accordance with the applicable requirements of AWS D1.1 and specified in this section.</li> </ul>			
1.6.1	<ul style="list-style-type: none"> <li>Welders, welding operators, and tacker qualified by test within the previous 6 months may be accepted for this contract without prequalification if all the followings conditions in the specification are met.</li> </ul>			

## General Structural and Welding Specification

### EDS Structural and Welding Specification (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
1.6.2	<ul style="list-style-type: none"> <li>Contractor shall submit the names of the welders, welding operators, and tackers to be employed, and certification that each individual is qualified as specified.</li> <li>The certification shall state the type of welding and positions for which the welder, welding operator, or tacker is qualified, the code and procedure under which the individual is qualified, date qualified, and the name of the firm and person certifying the qualification tests.</li> <li>The certification shall be kept on file.</li> <li>Three copies shall be furnished.</li> <li>The certification shall be kept current for the duration of the contract.</li> </ul>			
1.6.3	<ul style="list-style-type: none"> <li>Requalification of a welder or welding operator shall be required under any of the conditions found in specification.</li> </ul>			
1.7	<ul style="list-style-type: none"> <li>Inspection and nondestructive testing personnel shall be qualified in accordance with the requirements of ASNT-01 for Levels I or II in the applicable nondestructive testing method.</li> </ul>			
1.8	<ul style="list-style-type: none"> <li>Symbols shall be in accordance with AWS A2.4, unless otherwise indicated.</li> </ul>			

## General Structural and Welding Specification

### EDS Structural and Welding Specification (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
2.1	<ul style="list-style-type: none"> <li>All welding equipment, electrodes, welding wire, and fluxes shall be capable of producing satisfactory welds.</li> <li>All welding equipment and materials shall comply with the applicable requirements of AWS D1.1.</li> </ul>			
2.2	<ul style="list-style-type: none"> <li>All bolts below the deck level shall be high strength bolts conforming to ASTM A325-04b.</li> </ul>			
3.1	<ul style="list-style-type: none"> <li>AISC ASD shall govern the work.</li> <li>Fabrication shall be in accordance with the applicable provisions of AISC ASD.</li> <li>The fabricating contractor shall be certified under the AISC FCD for Category A structural steelwork.</li> </ul>			
3.2.1	<ul style="list-style-type: none"> <li>Workmanship and techniques for welded construction shall conform to the requirements of AWS D1.1, AWS D1.6, and AISC.</li> <li>When AWS D1.1 and AISC Specification conflict, the requirements of AWS D1.1 shall govern.</li> </ul>			
3.2.2	<ul style="list-style-type: none"> <li>Welds shall be identified in one of the ways found in specification.</li> </ul>			

## General Structural and Welding Specification

### EDS Structural and Welding Specification (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
3.3	<ul style="list-style-type: none"> <li>The contractor shall perform visual inspection to determine conformance with paragraph 3.4 STANDARDS OF ACCEPTANCE in the specifications.</li> <li>Procedures and techniques for inspections shall be in accordance with applicable requirements of AWS D1.1.</li> </ul>			
3.4	<ul style="list-style-type: none"> <li>Dimensional tolerances for welded construction, details of welds, and quality of welds shall be in accordance with the applicable requirements of AWS D1.1 and the contract drawings.</li> <li>The extent of nondestructive testing shall be 20 percent of welds or joints, as indicated on the drawings.</li> <li>Nondestructive testing shall be by visual inspection methods.</li> </ul>			
3.4.1	<ul style="list-style-type: none"> <li>The welding shall be subject to inspection and tests in the mill, shop, and field.</li> </ul>			
3.4.2	<ul style="list-style-type: none"> <li>The contractor shall employ qualified welders or welding operators and shall use the proper joints and welding procedures including peening or heat treatment if required to develop the full strength of the members and joints cut and to relieve residual stress.</li> </ul>			

## General Structural and Welding Specification

### EDS Structural and Welding Specification (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
3.6	<ul style="list-style-type: none"> <li>When inspection or testing indicates defects in the weld joints, the welds shall be repaired using a qualified welder or welding operator as applicable.</li> <li>Corrections shall be in accordance with the requirements of the specifications.</li> <li>Defects shall be repaired in accordance with the approved procedures.</li> <li>Defects discovered between passes shall be repaired before additional weld material is deposited.</li> <li>Repair welds shall meet the inspection requirements for the original welds.</li> <li>Any indication of a defect shall be regarded as a defect, unless reevaluation by nondestructive methods or by surface conditioning shows that no unacceptable defect is present.</li> </ul>			

Notes:

<sup>a</sup> Checklist based on Section 01500 General Structural and Welding Specification dated 08/01/2006.

AISC = American Institute of Steel Construction  
 ASNT = American Society of Non-destructive Testing  
 AWS = American Welding Society

## Trailer Subsystem Electrical Specification

### EDS Trailer Subsystem Electrical Specification

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
1.2	<ul style="list-style-type: none"> <li>All conduit routing shall be from underneath the trailer to a pre-determined location.</li> <li>The designation shall be labeled on the conduit routing schedule in the drawing package.</li> <li>Power and control wiring shall be separated in conduits at all times, unless otherwise specified in the drawing package.</li> <li>At predetermined points on the trailer, there shall be 120 VAC receptacles in the framework.</li> <li>All receptacles mounted on the trailer shall have hinge type covers and gaskets installed, and shall be rated for use in wet locations.</li> </ul>			
2.1	<ul style="list-style-type: none"> <li>For materials and equipment, use only the latest design and standard products of established manufacturers.</li> <li>For uniformity, only one manufacturer is acceptable for each type of product.</li> <li>Individual parts must be manufactured to standard sizes and gauges so repair parts can be installed in the field.</li> </ul>			
2.2	<ul style="list-style-type: none"> <li>The wiring of the 120 VAC solenoid on the main air line to the control panel shall be in accordance with drawing A74429. This wiring shall be installed in a conduit and labeled P-36.</li> </ul>			
2.3	<ul style="list-style-type: none"> <li>All receptacles shall be of the 3-prong type.</li> </ul>			



## Trailer Subsystem Electrical Specification

### EDS Trailer Subsystem Electrical Specification (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
2.4	<ul style="list-style-type: none"> <li>The battery charger shall be from Charging Systems International, part number PRO2SS.</li> <li>The battery remote meter shall be wired in accordance with the cable routing drawing A73817 Sheets 1 and 2.</li> </ul>			
2.5	<ul style="list-style-type: none"> <li>The main power plug shall be a pin-and-sleeve type receptacle equipped for 480 VAC, 3-phase, 200 Amps from Russellstoll, part numbers DS2404MP000, DS2404FP000, DS2CC and DS2404MR000.</li> <li>The cables shall be 100 ft and 50 ft lengths and shall be rated at 600 volts, size 3/0, 4-wire, Type W. The 100 ft cable shall contain male and female plugs, while the 50 ft cable contains only a female plug on one end.</li> <li>The power platform panel signal cable shall be 80 inches long, 16-pair, size 16 AWG, 600 volts cable. The male end of the plug shall be labeled P5 and connect to the trailer, and the female end shall be labeled P7 and connect to the panel. Refer to drawing A72632.</li> <li>The power platform power cable shall be 80 inches long, 20-conductor, 12 gauge, 600 volts cable. The male end of the plug shall be labeled P4 and connect to the trailer, and the female end shall be labeled P6 and connect to the panel. Refer to drawing A72635.</li> </ul>			

## Trailer Subsystem Electrical Specification

### EDS Trailer Subsystem Electrical Specification (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
2.6	<ul style="list-style-type: none"> <li>The trailer power receptacle, two 60 Amp receptacles, and the power and control signal receptacles shall be in accordance with the drawings. Refer to the Explosive Destruction System Phase 2 Trailer Subsystem Electrical Specifications, specification 3.1 for a list of the drawings.</li> </ul>			
2.7	<ul style="list-style-type: none"> <li>The main disconnect switch shall be a non-fusible switch from ABB, part number NF2004-3PB8A. The disconnect shall be a NEMA 4X enclosure, stainless steel, and shall consist of three current transformers (CT) from Electro Industries, part number 16RBT-301, rated at 300.5 ratio, 50-400 Hz, 600 volts.</li> <li>The grounding lug within the disconnect shall be from Llsc0, part number AU-250, and shall be capable of wire sizes of 250MCM-6 STR.</li> </ul>			
2.8	<ul style="list-style-type: none"> <li>The general tool box shall be a Hoffman, part number CSD242412SS, and shall be modified to house the battery charger for the radio frequency components of the containment vessel.</li> </ul>			
2.9	<ul style="list-style-type: none"> <li>The command post assembly shall be a Hoffman enclosure showing the temperature and pressure of the containment vessel. The temperature and pressure meters shall be Watlow meters and shall be wired to the J11, located on the gutter G9.</li> </ul>			

## Trailer Subsystem Electrical Specification

### EDS Trailer Subsystem Electrical Specification (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
2.10	<ul style="list-style-type: none"> <li>The trailer transition box, located on the bottom side of the trailer shall be field-wired to the J4 and J5 receptacles on the curb side of the trailer.</li> </ul>			
2.11	<ul style="list-style-type: none"> <li>The trailer shall include three emergency process off switches (EPO). Wiring for the EPOs shall enter a Hoffman enclosure, part number A6044CHNFSS, via rigid conduit.</li> </ul>			
3.1	<ul style="list-style-type: none"> <li>When a deviation from the standards designated in the specifications and drawings is required, the proposed specifications for materials and equipment must have government approval from the Contracting Officer Technical Representative (COTR). Deviation requests must be submitted prior to making any changes.</li> <li>The as-built drawings shall be a record of the construction as installed. The drawings shall include all the information shown on the contract drawings, deviations, modifications, and changes from the contract drawings, however minor. The as-built drawings shall be kept on the job site and updated daily.</li> <li>The as-built drawings shall be a full sized set of prints marked to reflect all deviations, changes and modifications.</li> <li>The as-built drawings shall be complete and show location, size, dimensions, part identification and other information. Additional sheets may be added as needed.</li> </ul>			

## **Trailer Subsystem Electrical Specification**

### **EDS Trailer Subsystem Electrical Specification (Continued)**

Notes:

<sup>a</sup> Checklist based on Section 1610 Trailer Subsystem Electrical Specification dated 08/01/2006.

ABB	=	Asea Brown Bovevi, Inc.
AWG	=	American wire gauge
NEMA	=	National Electrical Manufacturers Association
STR	=	Software Test Report
VAC	=	volts alternating current

## Containment Vessel Subsystem Electrical Specification

### EDS Containment Vessel Subsystem Electrical Specification

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
2.1	<ul style="list-style-type: none"> <li>For materials and equipment, use only the latest design and standard products of established manufacturers.</li> <li>For uniformity, only one manufacturer is acceptable for each type of product.</li> <li>Individual parts must be manufactured to standard sizes and gauges, so repair parts can be installed in the field.</li> </ul>			
2.2	<ul style="list-style-type: none"> <li>The heaters shall be from Therm-X, part number XTMH1036 and shall meet the following criteria: 480 VAC, single phase; 7.5 kilowatt band heaters; 36.5 inside diameter (ID); 6 inches wide. Refer to drawing A67256 sheet 3 and A74391 for location of the heater bands.</li> </ul>			
2.3	<ul style="list-style-type: none"> <li>Two heater junction boxes, located on the rear of the vessel, shall be Hoffman enclosures, part number A12106CHNFSS. Inside of each box shall be three 35 amp Class J fuses, one for each phase. Refer to drawings A71146, A71667, A71689, A71668.</li> </ul>			
2.4	<ul style="list-style-type: none"> <li>The slip ring shall be from Moog Component Group Polyscientific, part number AC609806X078. The slip rings shall be rated at 480 VAC, 50 amps and shall have 10 ft leads on both the input and output side. The leads shall be enclosed in a flexible conduit with only approximately 4 inches of exposed wire near the slip ring on both sides.</li> </ul>			

## Containment Vessel Subsystem Electrical Specification

### EDS Containment Vessel Subsystem Electrical Specification (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
2.5	<ul style="list-style-type: none"> <li>The containment vessel heater disconnect, located on the rotary agitation framework, shall be from ABB, part number NF63X-3PB6A and shall meet the following criteria: non-fusible NEMA 4X stainless enclosure with pistol type handle. The disconnect shall be rated at 600 volts and 80 amps and shall be labeled VHDS1. Refer to drawing A69832-P2.</li> </ul>			
3.1	<ul style="list-style-type: none"> <li>When a deviation from the standards designated in the specifications and drawings is required, the proposed specifications for materials and equipment must have government approval to the Contracting Officer Technical Representative (COTR). Deviation requests must be submitted prior to making any changes.</li> <li>The as-built drawings shall be a record of the construction as installed. The drawings shall include all the information shown on the contract drawings, deviations, modifications, and changes from the contract drawings, however minor. The as-built drawings shall be kept on the job site and updated daily.</li> <li>The as-built drawings shall be a full sized set of prints marked to reflect all deviations, changes, and modifications.</li> <li>The as-built drawings shall be complete and show location, size, dimensions, part identification, and other information. Additional sheets may be added as needed.</li> </ul>			

## **Containment Vessel Subsystem Electrical Specification**

### **EDS Containment Vessel Subsystem Electrical Specification (Continued)**

Notes:

<sup>a</sup> Checklist based on Section 1710 Containment Vessel Subsystem Electronic Specification dated 08/01/2006.

amp	=	ampere(s)
NEMA	=	National Electrical Manufacturers Association
VAC	=	volts alternating current

## Containment Vessel Subsystem Instrumentation Specification

### EDS Containment Vessel Subsystem Instrumentation Specification

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
1.1	<ul style="list-style-type: none"> <li>All components shall be installed by a single contractor to ensure system uniformity, subsystem compatibility, and coordination of all system interfaces.</li> <li>Deviations may be considered in special circumstances but must be approved by the engineer.</li> </ul>			
2.1.1	<ul style="list-style-type: none"> <li>The pressure transmitter shall be from Stellar Technology, part number ST1550-1500A-129 or a government approved equal. The location of the transmitter is shown on drawing A68217-P2.</li> <li>The pressure transmitter shall be hermetically sealed, 316 stainless steel, bonded foil strain gauge designed to read 0 to 1,500 psig, with a proof pressure of 1.5 times the pressure range and burst pressure of 3 times this range.</li> <li>The transmitter must provide 4 to 20 ma output for 0 to 1,500 psig.</li> </ul>			
2.1.2	<ul style="list-style-type: none"> <li>The temperature sensor shall be a Minco, part number AS5106KU or a government approved equal.</li> <li>The temperature sensor shall be a dual-element thermocouple type K. The thermocouple sensor shall have temperature/electromagnetic force (EMF) relationships and standard limits of error per American National Standards Institute (ANSI) MC96.1.1982. The location of the thermocouple is shown on drawing A67256.</li> </ul>			



## Containment Vessel Subsystem Instrumentation Specification

### EDS Containment Vessel Subsystem Instrumentation Specification (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
	<ul style="list-style-type: none"> <li>Temperature sensors shall be equipped with accessory equipment as indicated on the associated drawings and specified on the instrument list drawing A70220-P2. In general, accessory equipment shall consist of general purpose, National Electrical Manufacturers Association (NEMA) 4 and/or explosion-proof connection heads; pipe extensions with union connectors or bushings; wells or protecting tubes and spring-loaded assemblies.</li> <li>Sensors of standard construction shall be supplied unless specially constructed sensors are specified on the instrument list or required by details on the associated drawings.</li> <li>The thermocouple housing and well or protecting tube material shall be 316 stainless steel unless otherwise noted on the associated drawings.</li> <li>For a list of associated drawing numbers, refer to the Containment Vessel Subsystem Instrumentation Specifications, Part 3, Specification 3.1</li> </ul>			

## Containment Vessel Subsystem Instrumentation Specification

### EDS Containment Vessel Subsystem Instrumentation Specification (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
2.1.3	<ul style="list-style-type: none"> <li>The non-contact infrared temperature sensor shall be a Raytek, part number RAYCI 2B-10L or a government approved equal. The location of the infrared temperature sensor is shown on drawing A72021.</li> <li>The infrared sensor shall be enclosed in a rugged NEMA 4 stainless steel enclosure and be powered from 12 to 24 volts direct current (VDC).</li> <li>The infrared sensor shall have a type K thermocouple signal output and be capable of accurately measuring the temperature range of 86° to 932°F.</li> <li>The infrared sensor shall be equipped with accessory mounting equipment as indicated in the associated drawing. In general, accessory equipment shall consist of the necessary mounting brackets and mounting nuts.</li> </ul>			

## Containment Vessel Subsystem Instrumentation Specification

### EDS Containment Vessel Subsystem Instrumentation Specification (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
2.1.4	<ul style="list-style-type: none"> <li>The radio frequency transmitter shall be capable of transmitting the analog signals from the vessel pressure transmitter and vessel temperature sensor to the radio receiver in the utility panel (see Electrical Subsystem Specification).</li> <li>The radio frequency transmitter shall be fabricated in accordance with associated drawings. The primary overview drawing is A69486-P2. The transmitter shall be wired in accordance with drawings A69786-P2 and A69486-P2 Sheet 2. The transmitter shall be fabricated in strict accordance with these drawings to enable the commercially manufactured pieces of equipment to mount properly.</li> </ul>			
3.2	<ul style="list-style-type: none"> <li>Materials and installation shall comply with the requirements of the current editions of referenced codes and standards, and the codes and standards referred to shall be used for establishing the minimum quality of the materials and equipment supplied and installed.</li> <li>All equipment of the same type shall be produced from the same manufacturer.</li> </ul>			

Notes:

<sup>a</sup> Checklist based on Section 1720 Containment Vessel Subsystem Instrumentation Specification dated 08/01/2006.

psig = pounds per square in gauge  
ma = milliampere

## Containment Vessel Subsystem Mechanical Specification

### EDS Containment Vessel Subsystem Mechanical Specification

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
1.1	<ul style="list-style-type: none"> <li>All components shall be installed by a single contractor to ensure system uniformity, subsystem compatibility, and coordination of all system interfaces.</li> <li>Deviations may be considered in special circumstances but shall be approved by the engineer.</li> </ul>			
1.2	<ul style="list-style-type: none"> <li>The containment vessel shall be tested to 4,200 psi with a rated working pressure of 2,800 psi at 125°F.</li> </ul>			
2.1.1	<ul style="list-style-type: none"> <li>Refer to specification for components of the sample panel assembly.</li> </ul>			
2.1.2	<ul style="list-style-type: none"> <li>The 1/2 inch NPT drain assembly (refer to drawings A67256 #21 and A71123) shall be a Swagelok part number SS-810-1-8.</li> </ul>			
2.1.3	<ul style="list-style-type: none"> <li>The 3/8 inch NPT drain assembly (refer to drawings A67256 #21 and A71124) shall be a Swagelok part number SS-810-1-6.</li> </ul>			
2.1.4	<ul style="list-style-type: none"> <li>The spray nozzle shall be a Bete, part number 3/8-TF16-FCN 316, and shall meet the following criteria: Spiral full cone spray; 90 degree nozzle; 3/8 inch male connection; 10.6 gpm at 40 psi; 0.25 inch orifice diameter; 1.88 inch overall height; 316 SS construction.</li> </ul>			

## Containment Vessel Subsystem Mechanical Specification

### EDS Containment Vessel Subsystem Mechanical Specification (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
2.1.5	<ul style="list-style-type: none"> <li>The containment heater shrouds shall be per specifications and drawings A71134, A71135, A71142 #6, and A71137 #7.</li> <li>The adjustable draw latch shall be a McMaster-Carr, part number 11605A with a 200 pound workload limit.</li> </ul>			
2.1.6	<ul style="list-style-type: none"> <li>The containment vessel heater insulation shall be a Specialty Product &amp; Insulation Company, part number 18005, E-glass mat 1 inch thick x 60 inches wide by 3 feet 9 inches long, rated at 500°F.</li> </ul>			
2.1.7	<ul style="list-style-type: none"> <li>Refer to specification for shipping configuration components.</li> </ul>			
2.1.8	<ul style="list-style-type: none"> <li>The vessel door seal ring, seal protector ring, and O-ring shall be in accordance with drawings A67256 #67, A71700 #43, and A72018. The O-ring shall be 34.95-inch diameter x 0.275 cross-section, ethylene propylene with a temperature range of -70° to 250°F. Use Darcoid Nor-Cal Seal.</li> </ul>			
2.1.9	<ul style="list-style-type: none"> <li>The pillow block mounted bearing shall be a Boston Gear part number MB-3 64585, medium duty, set screw locking, extended inner race, 1/4-28 threaded grease fitting, one-piece high grade cast iron housing and a radial load capacity of 5,400 pounds at 50 rpm.</li> </ul>			

## Containment Vessel Subsystem Mechanical Specification

### EDS Containment Vessel Subsystem Mechanical Specification (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
3.2.1	<ul style="list-style-type: none"> <li>Hydrostatic test of containment vessel shall be in accordance with procedure GP 14.0 Rev A/SUPPL S2 as shown on drawing H90063-119-2 Rev A, Sheet 1, Note 3.</li> </ul>			
3.2.2	<ul style="list-style-type: none"> <li>Torque bolts for containment vessel as shown on drawing H90063-119-2 Rev A, Sheet 1, Notes 5 and 6, and as prescribed in the applicable codes.</li> </ul>			
3.2.3	<ul style="list-style-type: none"> <li>All fittings and systems shall be tested as prescribed on the associated drawings.</li> </ul>			
3.2.5	<ul style="list-style-type: none"> <li>All field fabricated piping shall be free of mill scale, de-burred, and cleaned for service in accordance with the manufacturer's recommendations.</li> </ul>			
3.2.6	<ul style="list-style-type: none"> <li>Tubes and fittings shall be cleaned to remove oil, grease, and loose particles.</li> </ul>			
3.2.7	<ul style="list-style-type: none"> <li>Gland nuts shall have a torque of 30 ft-lb after installation unless otherwise noted.</li> </ul>			
3.2.8	<ul style="list-style-type: none"> <li>Assembled components shall be lubricated or coated as required by product specifications to prevent galling, reduce friction, and ensure proper sealing.</li> </ul>			

## **Containment Vessel Subsystem Mechanical Specification**

### **EDS Containment Vessel Subsystem Mechanical Specification (Continued)**

Notes:

<sup>a</sup> Checklist based on Section 1730 Containment Vessel Subsystem Mechanical Specification dated 08/01/2006.

ft-lb	=	foot-pound
gpm	=	gallons per minute
NPT	=	National Pipe Thread
psi	=	pounds per square inch
rpm	=	revolutions per minute
SS	=	stainless steel

## Hydraulic Nut Subsystem Electrical Specification

### EDS Hydraulic Nut Subsystem Electrical Specification

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
1.1	<ul style="list-style-type: none"> <li>All components shall be installed by a single contractor to ensure system uniformity, subsystem compatibility, and coordination of all system interfaces.</li> <li>Deviations may be considered in special circumstances but must be approved by the engineer.</li> </ul>			
2.1	<ul style="list-style-type: none"> <li>For materials and equipment, use only the latest design and standard products of established manufacturers.</li> <li>For uniformity, only one manufacturer is acceptable for each type of product.</li> <li>Individual parts must be manufactured to standard sizes and gauges, so repair parts can be installed in the field.</li> </ul>			



## Hydraulic Nut Subsystem Electrical Specification

### EDS Hydraulic Nut Subsystem Electrical Specification

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
2.2	<ul style="list-style-type: none"> <li>The junction box shall be a Hoffman, part number A-8064CHNFSS.</li> <li>The cord-grip connector shall be a Thomas &amp; Betts 25230 with a 90 degree, 6-pin connector and cord. Refer to wiring diagram A69514-P2 for proper connections. Wiring shall be attached to the terminal board using insulated ring tongue terminals.</li> <li>The wiring for the emergency process shutdown switch and the infrared temperature detector shall be routed through the junction box.</li> <li>From the junction box, the cable shall be installed in a rigid conduit to the emergency process shutdown switch enclosure.</li> <li>The infrared temperature detector cable shall be routed directly from the device in metallic flexible conduit to the emergency process shutdown enclosure.</li> </ul>			
2.3	<ul style="list-style-type: none"> <li>The junction box receptacle shall be standard single 3-prong 110 VAC and mounted within the box.</li> </ul>			
2.4	<ul style="list-style-type: none"> <li>The mini plugs for the controls of the hydraulic nut pump shall be receptacle-mini change 6-prong male and a plug-mini change 6-prong female and shall be from Daniel Woodhead Company, part number 1R6004A20A201.</li> <li>The plug for the pressure transducer is a wall receptacle 3-pin and shall be from Bendix, part number P00P 8-35.</li> </ul>			

## Hydraulic Nut Subsystem Electrical Specification

### EDS Hydraulic Nut Subsystem Electrical Specification

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
2.5	<ul style="list-style-type: none"> <li>The hydraulic nut pump pendent shall be from Daniel Woodhead Company, part number 55503. Refer to drawing A71992.</li> </ul>			
3.1	<ul style="list-style-type: none"> <li>The as-built drawings shall be a record of the construction as installed. The drawings shall include all the information shown on the contract drawings, deviations, modifications, and changes from the contract drawings, however minor. The as-built drawings shall be kept on the job site and updated daily.</li> <li>The as-built drawings shall be a full sized set of prints marked to reflect all deviations, changes, and modifications.</li> <li>The as-built drawings shall be complete and show location, size, dimensions, part identification, and other information. Additional sheets may be added as needed.</li> </ul>			

Notes:

<sup>a</sup> Checklist based on Section 1810 Hydraulic Nut Subsystem Electrical Specification dated 08/01/2006.

VAC = volts alternating current

## Hydraulic Nut Subsystem Instrumentation Specification

### EDS Hydraulic Nut Subsystem Instrumentation Specification

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
1.1	<ul style="list-style-type: none"> <li>All components shall be installed by a single contractor to ensure system uniformity, subsystem compatibility and coordination of all system interfaces. Deviations may be considered in special circumstances but must be approved by the engineer.</li> </ul>			
2.1.1	<ul style="list-style-type: none"> <li>The pressure transmitter, which reads the P-306 Tensioner pump, shall be from Stellar Technology, part number ST1550-10000A-130 or a government approved equal.</li> <li>The pressure transmitter shall be hermetically sealed, 316 stainless steel, bonded foil strain gauge designed to read 0 to 10,000 psig, with a proof pressure of 1.5 times the pressure range and burst pressure of 3 times this range.</li> </ul>			
2.1.2	<ul style="list-style-type: none"> <li>The two pressure switches shall be SPX Power Team model 9625 or a government approved equal and are supplied as part of the SPX Power Team hydraulic pump package, part number Q011065-PE302S.</li> <li>The pressure switch set-points shall be detailed on the drawings. Switches shall be adjustable from 1,000 to 10,000 psig with one pressure switch to turn the pump on and the other switch to turn the pump off.</li> </ul>			

## Hydraulic Nut Subsystem Instrumentation Specification

### EDS Hydraulic Nut Subsystem Instrumentation Specification (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
2.1.3	<ul style="list-style-type: none"> <li>The two pressure gauges shall be SPX Power Team model 9053 or a government approved equal. The pressure gauge associated with the direct discharge from the hydraulic pump (drawing A69514-P2) is supplied as part of the SPX Power Train hydraulic pump package Q011065-PE302S.</li> <li>The pressure gauges shall meet the following criteria: 4-inch diameter face; red day-glo needle; rated at 0 to 10,000 psi; major graduations of 2,000 psi; minor graduations of 200 psi; 1/4-inch NPT connections; high strength steel bourdon tube; stainless steel case; lens locking ring; ASME B40.1 Grade B; convertible to "wet" using liquid silicone.</li> </ul>			
3.2	<ul style="list-style-type: none"> <li>Materials and installation shall comply with the requirements of the current editions of referenced codes and standards, and the codes and standards referred to shall be used for establishing the minimum quality of the materials and equipment supplied and installed.</li> <li>Teflon tape shall be used on hydraulic-threaded connections.</li> <li>All equipment of the same type shall be produced from the same manufacturer.</li> </ul>			

## Hydraulic Nut Subsystem Instrumentation Specification

### EDS Hydraulic Nut Subsystem Instrumentation Specification (Continued)

Notes:

<sup>a</sup> Checklist based on Section 1820 Hydraulic Nut Subsystem Instrumentation Specification dated 08/01/2006.

ASME	=	American Society of Mechanical Engineers
NPT	=	National Pipe Thread
psi	=	pounds per square inch
psig	=	pounds per square inch gauge

## Hydraulic Nut Subsystem Mechanical Specification

### EDS Hydraulic Nut Subsystem Mechanical Specification

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
1.1	<ul style="list-style-type: none"> <li>All components shall be installed by a single contractor to ensure system uniformity, subsystem compatibility, and coordination of all system interfaces.</li> <li>Deviations may be considered in special circumstances but must be approved by the engineer.</li> </ul>			
2.1.1	<ul style="list-style-type: none"> <li>The electric hydraulic pump shall be a SPX Power Team model Q011065-PE302S and meet the following criteria: 1 hp, 115 VAC; 60 Hz, single phase; rated at 10,000 psi; 30-inch<sup>3</sup>/min oil delivery.</li> <li>The electric hydraulic pump shall include a 280 inch cubed (1-1/4 gal) reservoir, 3-way 2-position valve advance return for use with cylinder type single-acting remote control switch for motor, and solenoid valve 24 volt, 82 dBA at 10,000 psi and 87 dBA at 0 psi, CSA rated for intermittent duty.</li> <li>The electric pump over-all dimensions shall not exceed 10 inches L x 9 inches W x 16 inches H.</li> </ul>			
2.1.2	<ul style="list-style-type: none"> <li>The hydraulic solenoid valve shall be a SPX Power Team model 9579 and meet the following criteria: rated at 10,000 psi; 3/8-inch ports; 5 gpm maximum flow; 3-way, 2-position; 115 volt, 50/60 Hz.</li> </ul>			

## Hydraulic Nut Subsystem Mechanical Specification

### EDS Hydraulic Nut Subsystem Mechanical Specification (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
2.1.3	<ul style="list-style-type: none"> <li>Hydraulic hoses shall be a SPX Power Team model 9765 (2 ft) or 9768 (8 ft) and meet the following criteria: 1/4-inch inside diameter; polyurethane with spring guards; 3/8 NPTF Fittings; rated at 10,000 psi; 20,000 psi burst rating; comply with MHI standard IJ100.</li> </ul>			
2.1.4	<ul style="list-style-type: none"> <li>Hydraulic couplings shall be a SPX Power Team model 9792 and meet the following criteria: half quick couplers; rated at 10,000 psi; high flow, no spill type; push to connect with locking collar; flush face.</li> </ul>			
2.1.5	<ul style="list-style-type: none"> <li>Hydraulic fittings shall be a SPX Power Team model 9672 (T-fittings), 9680 (unions) 9681 (elbows), 9689 (reducers), 9699 (45 degree fitting), NPTF, rated at 10,000 psi maximum operating pressure.</li> </ul>			
2.1.6	<ul style="list-style-type: none"> <li>The hydraulic filter shall be a SPX Power Team model 21608 with brass wire screen mesh No. 100.</li> </ul>			
2.1.7	<ul style="list-style-type: none"> <li>The hydraulic relief valve shall be a SPX Power Team model 21278-105 with 3/8-inch ports, 5 gpm maximum flow rate, and rated for 10,000 psi. Pressure setting should be 10,000 to 10,700 psi.</li> </ul>			

## Hydraulic Nut Subsystem Mechanical Specification

### EDS Hydraulic Nut Subsystem Mechanical Specification (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
2.1.8	<ul style="list-style-type: none"> <li>The hydraulic nut assembly shall be an HTI model 671SR and meet the following criteria: rated at 10,000 psi; 3-1/2-inch 8-UN-2B thread size; 8.70 inches maximum engagement; 232,200 lbf maximum capacity; 23.22 inches squared hydraulic area; 2.0-inch stroke; spring return; 9.78 inches overall height; 7.625 outside diameter; 1/4-inch NPT port.</li> </ul>			
3.2.1	<ul style="list-style-type: none"> <li>Materials and installation shall comply with the requirements of the current editions of referenced codes and standards, and the codes and standards referred to shall be used for establishing the minimum quality of the materials and equipment supplied and installed.</li> <li>All equipment of the same type shall be produced from the same manufacturer.</li> <li>Capacities of all equipment shall not be less than that indicated on the drawings or specified.</li> </ul>			



## Hydraulic Nut Subsystem Mechanical Specification

### EDS Hydraulic Nut Subsystem Mechanical Specification (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
3.2.2	<ul style="list-style-type: none"> <li>Hydraulic threaded connections shall be installed with Teflon tape.</li> <li>Teflon tape shall be applied to fittings according to the latest industry standards and practices and any referenced procedures. Refer to the Explosive Destruction System Phase 2 Series O&amp;M Manual, Rev 0, April 2005, procedure RSS-22.</li> <li>Hydraulic fluid shall be ISO 46 Mobile DTE 25 or a government approved equal.</li> <li>All hydraulic hoses, fittings, and components shall be properly cleaned and flushed prior to installation.</li> <li>All equipment shall be installed in accordance with the manufacturer's recommendations.</li> </ul>			
3.2.3	<ul style="list-style-type: none"> <li>The maximum extension of the hydraulic nut shall not be exceeded. (A red line appears when the nut is close to the maximum extension.)</li> <li>The maximum rated pressure of the hydraulic nut shall not be exceeded.</li> </ul>			

Notes:

<sup>a</sup> Checklist based on Section 1830 Hydraulic Nut Subsystem Mechanical Specification dated 08/01/2006.

dBA = decibels using the A-weighted scale  
 ft = foot  
 gal = gallon(s)  
 gpm = gallons per minute  
 hp = horsepower

## Hydraulic Nut Subsystem Mechanical Specification

### EDS Hydraulic Nut Subsystem Mechanical Specification

Notes: continued

Hz	=	hertz
ISO	=	International Organization for Standardization
lbf	=	pounds of force
NPTF	=	National Pipe Thread Female
O&M	=	Operations and Maintenance
VAC	=	volts alternating current

## Rotary Agitation Subsystem Electrical Specification

### EDS Rotary Agitation Subsystem Electrical Specification

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
1.1	<ul style="list-style-type: none"><li>• The complete supply and installation of the Rotary Agitation Subsystem shall be installed by a single contractor to ensure system uniformity, subsystem compatibility, and coordination of all system interfaces.</li><li>• Deviations may be considered in special circumstances but must be approved by the engineer.</li></ul>			
2.1	<ul style="list-style-type: none"><li>• For materials and equipment, use only the latest design and standard products of established manufacturers.</li><li>• For uniformity, only one manufacturer is acceptable for each type of product.</li><li>• Individual parts must be manufactured to standard sizes and gauges, so repair parts can be installed in the field.</li></ul>			

## Rotary Agitation Subsystem Electrical Specification

### EDS Rotary Agitation Subsystem Electrical Specification (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
2.2	<ul style="list-style-type: none"> <li>Variable speed drives shall conform to NFPA, NEMA, and IEC standards. All drives shall incorporate current overload, phase to phase, and phase to ground protection and shall be of designed manufacture or a government approved equal.</li> <li>The variable speed drive shall be a Sew Eurodrive, part number MDV60A022-5A3-4-00 and meet the following criteria: rated at 460 volts; 60 Hz, 3-phase; 2.2 kW; analog and digital I/O; RS 485 interface.</li> <li>The drive shall have an interface control panel capable of running the drive in local mode. The output voltage shall be locally adjustable from 0 to 100% of input voltage. A remote mode shall be included with the capability to produce a pulse width modulated (PWM) wave form.</li> <li>Variable speed drive parameters shall be menu programmable from the interface panel.</li> </ul>			
2.3	<ul style="list-style-type: none"> <li>The electric motor shall be rated at 480 VAC, 3 hp, 4.3 amps, and 1,720 rpm.</li> <li>The incremental encoder shall be a Sew Eurodrive, part number ES1S with a 100-ft cable.</li> <li>The motor drive assembly shall be ordered as a complete assembly from Sew Eurodrive, part number K107R77DT100LS48MG4HRTFES.</li> </ul>			
2.4	<ul style="list-style-type: none"> <li>The absolute encoder shall be a Stegmann, part number AG 626 WSR.</li> </ul>			

## Rotary Agitation Subsystem Electrical Specification

### EDS Rotary Agitation Subsystem Electrical Specification (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
2.5	<ul style="list-style-type: none"> <li>The drive power panel shall include cooler fans to help eliminate the heat buildup in the panel.</li> <li>All components in the drive control panel shall be labeled as shown on the drawings. For more details, refer to Electrical Subsystem Specifications.</li> </ul>			
2.6	<ul style="list-style-type: none"> <li>The flexible conduit shall run from the trailer floor way to a drive motor junction box that is mounted at the rear of the drive motor supports. From the junction box, the wiring shall run in an enclosed wire way approximately 4-feet long. A rigid conduit at the top of the wire way shall branch off to an enclosure for the motor, and flex shall be used to go to the encoder and fan motor.</li> </ul>			

## Rotary Agitation Subsystem Electrical Specification

### EDS Rotary Agitation Subsystem Electrical Specification (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
3.1	<ul style="list-style-type: none"> <li>When a deviation from the standards designated in the specifications and drawings is required, the proposed specifications for materials and equipment must have government approval to the Contracting Officer Technical Representative (COTR). Deviation requests must be submitted prior to making any changes.</li> <li>The as-built drawings shall be a record of the construction as installed. The drawings shall include all the information shown on the contract drawings, deviations, modifications, and changes from the contract drawings, however minor. The as-built drawings shall be kept on the job site and updated daily.</li> <li>The as-built drawings shall be a full sized set of prints marked to reflect all deviations, changes and modifications.</li> <li>The as-built drawings shall be complete and show location, size, dimensions, part identification, and other information. Additional sheets may be added as needed.</li> </ul>			

Notes:

<sup>a</sup> Checklist based on Section 1910 Rotary Agitation Subsystem Electrical Specification dated 08/01/2006.

amp	=	ampere(s)	kW	=	kilowatt(s)
ft	=	foot	NEMA	=	National Electrical Manufacturers Association
hp	=	horsepower	NFPA	=	National Fire Protection Association
Hz	=	hertz	rpm	=	revolutions per minute
IEC	=	International Engineering Consortium	VAC	=	volts alternating current

## Rotary Agitation Subsystem Mechanical Specification

### EDS Rotary Agitation Subsystem Mechanical Specification

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
1.1	<ul style="list-style-type: none"> <li>The complete supply and installation of the Rotary Agitation Subsystem shall be installed by a single contractor to ensure system uniformity, subsystem compatibility, and coordination of all system interfaces.</li> <li>Deviations may be considered in special circumstances but must be approved by the engineer.</li> </ul>			
2.1.1	<ul style="list-style-type: none"> <li>The coupler assembly shall be a REX, part number 425N, or a FALK part number 115FDP 20NN single flex disc, range of bore diameter 3 inches to 3.625 inches with a torque rating of 110,200 lb-in and maximum speed of 2,300 rpm.</li> </ul>			
2.1.2	<ul style="list-style-type: none"> <li>The worm gear screw jack with boot shall be from Nook Industries, part number 8690-01-00 and meet the following criteria: stainless steel (SS); upright keyed; 8-inch stroke; 15-ton capacity; 24 to 1 ratio; temperature range -20 to 200 degrees F.</li> </ul>			
2.1.3	<ul style="list-style-type: none"> <li>The hand wheel shall be from All American Products, part number 356-54 with a 6-inch diameter, made of stainless steel and round machined rim with a 1/8-inch center hub drilled for easy modification.</li> </ul>			
2.1.4	<ul style="list-style-type: none"> <li>The caster shall be a Hamilton R-MDX-124FST-CRS-FLAT maxi-duty rigid caster , 12-inch x 4-inch forged steel wheel with 1-1/4-inch precision tapered roller bearings and a 20,000 lb load capacity.</li> </ul>			

## Rotary Agitation Subsystem Mechanical Specification

### EDS Rotary Agitation Subsystem Mechanical Specification (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
2.1.5	<ul style="list-style-type: none"> <li>The leveling mount shall be a McMaster-Carr, part number 6103K29, swivel type, 303 stainless steel, 20,000 lb maximum load.</li> </ul>			
2.1.6	<ul style="list-style-type: none"> <li>Miscellaneous bolts, nuts, and washers shall be grade 8 or better. Miscellaneous fasteners shall be stainless steel for heavy duty service.</li> </ul>			
2.1.7	<ul style="list-style-type: none"> <li>Hydraulic couplings shall be a SPX Power Team model 9792 and meet the following criteria: half quick couplers; 10,000 psi maximum operating pressure; high flow, no spill type; push to connect with locking collar; flush face.</li> </ul>			
2.1.8	<ul style="list-style-type: none"> <li>Elbows shall be a SPX Power Team model 9686, 3/8-inch NPTF.</li> </ul>			
3.2	<ul style="list-style-type: none"> <li>The screw jack must be lubricated with NLG1 #1 grease prior to operation.</li> <li>Lubricants containing additives such as molydisulfide or graphite shall not be used.</li> </ul>			

Notes:

<sup>a</sup> Checklist based on Section 1930 Rotary Agitation Subsystem Mechanical Specification dated 08/01/2006.

lb = pound(s)  
 NPTF = National Pipe Thread Female  
 psi = pounds per square inch  
 rpm = revolutions per minute



## Reagent Supply Subsystem Electrical Specification

### EDS Reagent Supply Subsystem Electrical Specification

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
1.1	<ul style="list-style-type: none"> <li>Deviations may be considered in special circumstances but must be approved by the engineer.</li> </ul>			
2.1	<ul style="list-style-type: none"> <li>Provide materials and equipment of latest design standard products of established manufacturers.</li> <li>Make like parts of duplicate units interchangeable.</li> <li>Do not place equipment in service at any time prior to delivery except as required for factory or shop tests.</li> </ul>			
2.2	<ul style="list-style-type: none"> <li>The water and reagent tank heaters to be supplied are from Therm-X with part number XTRH972 Rev. 0. These heaters are 480 VAC and 8 kW.</li> <li>Each heater shall require the use of two heater straps provided by Therm-XMM030711-P3.</li> </ul>			

## Reagent Supply Subsystem Electrical Specification

### EDS Reagent Supply Subsystem Electrical Specification (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
2.3	<ul style="list-style-type: none"> <li>The motor shall be a 1.5 hp, 1,725 rpm, 115/230 VAC, 18/8 amp pump motor supplied from Industrial Motor Mfg.</li> <li>The motor shall be coupled with a Coke Pump, part number M03EASESSECJ.</li> <li>Controls for the pump cart shall be located within a Hoffman Enclosure, part number A-12P10.</li> <li>Front of panel shall have a lighted red push button corresponding to pump stop and a lighted green button corresponding to pump run.</li> <li>The cart pump shall be powered up through a 25 ft portable cord. The end of the cord shall have a 30 amp plug from Hubbell, part number HBL2611SW.</li> </ul>			

## Reagent Supply Subsystem Electrical Specification

### EDS Reagent Supply Subsystem Electrical Specification (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
3.1	<ul style="list-style-type: none"> <li>If the contractor must deviate from specifications and drawings, the contractor shall submit a statement of the exact nature of the deviation for government approval prior to any changes.</li> <li>The as-built drawings shall be a record of the construction as installed.</li> <li>The drawings shall include all the information shown on the contract drawings, deviations, modifications, and changes from the contract drawings, however minor.</li> <li>The as-built drawings shall be kept at the job site and updated daily.</li> <li>The as-built drawings shall be a full-sized set of prints marked to reflect all deviations, changes, and modifications.</li> <li>The as-built drawings shall be complete and show the location, size, dimensions, part identification, and other information.</li> <li>The as-built drawings shall be jointly inspected for accuracy and completeness by the contractor's quality control representative and by the Contracting Officer Technical Representative (COTR) prior to the submission of each monthly pay estimate.</li> </ul>			

## Reagent Supply Subsystem Electrical Specification

### EDS Reagent Supply Subsystem Electrical Specification (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
	<ul style="list-style-type: none"> <li>Upon review, the as-built drawings are found to contain errors and/or omissions, they shall be returned to the contractor for correction.</li> <li>The contractor shall correct and return the as-built drawings to the contract officer for approval within 10 calendar days from the time the drawings are returned to the contractor</li> </ul>			

Notes:

<sup>a</sup> Checklist based on Section 2010 Reagent Supply Subsystem Electrical Specification dated 08/01/2006.

amp = ampere(s)  
 ft = foot  
 hp = horsepower  
 kW = kilowatt(s)  
 rpm = revolutions per minute  
 VAC = volts alternating current

## Reagent Supply Subsystem Instrumentation Specification

### EDS Reagent Supply Subsystem Instrumentation Specification

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
2.1.1	<ul style="list-style-type: none"> <li>The pressure readout box assembly shall be fabricated and wired in accordance with the drawings listed in Section 3.1 of specification.</li> <li>The box shall use standard 1/16 DIN controllers for pressure readouts and shall use standard push-to-test indicator lights for valve position indicator lights.</li> <li>The box itself shall be a modified commercially available enclosure.</li> </ul>			
2.1.2	<ul style="list-style-type: none"> <li>Temperature sensors shall be thermocouples (TCs) type K.</li> <li>TC sensor shall have temperature/electromagnetic for (EMF) relationship and standard limits of error per American National Standards Institute (ANSI) MC96.1.1982.</li> <li>The TCs shall be dual element.</li> <li>Temperature sensors shall be equipped with accessory equipment as indicated on the drawings and specified on the Instrument List (Drawing A70220-P2).</li> <li>Accessory equipment shall consist of general purpose, National Electrical Manufacturers Association (NEMA) 4 and/or explosion proof connection heads; pipe extensions with union connectors or bushings; wells or protecting tubes; and spring-loaded assemblies.</li> </ul>			

## Reagent Supply Subsystem Instrumentation Specification

### EDS Reagent Supply Subsystem Instrumentation Specification (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
	<ul style="list-style-type: none"> <li>The TC housing and well or protecting tube material shall be 316 stainless steel (SS), unless otherwise specified on the drawings.</li> <li>Temperature sensors shall be Minco AS5106KU type or government-approved equal.</li> </ul>			
2.1.3	<ul style="list-style-type: none"> <li>The motor-operated valve shall be two-way, 1/4-turn, ball valve.</li> <li>The motor operator shall be designed for 120 volts alternating current (VAC) operation and shall be capable of cycling the valve, either open or closed in four seconds.</li> <li>The ball valve shall be three-piece construction with reinforced Polytetrafluoroethylene (PTFE) seats, and have end connection of 3/4-inch tube fittings.</li> <li>The valve must be supplied with necessary actuator bracket for mounting the motor operator.</li> <li>The valve, fittings, and actuator bracket must be constructed from 316 SS.</li> </ul>			

## Reagent Supply Subsystem Instrumentation Specification

### EDS Reagent Supply Subsystem Instrumentation Specification (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
	<ul style="list-style-type: none"> <li>The motor operator must be capable of being mounted in any orientation and still provide necessary opening and closing torque for the ball valve.</li> <li>The actuator enclosure must meet NEMA 4X requirements.</li> <li>The enclosure must have conduit connection and allow wiring to be done with the operator mounted and cover removed.</li> <li>The operator must power the valve open and power the valve closed.</li> <li>Upon loss of power, the valve shall remain as-is.</li> <li>Integral limit switches must be provided to allow electrical indication of valve position.</li> <li>The assembled motor-operated valve shall be Swagelok Model SS-63TS12-42AC or government-approved equal.</li> </ul>			
2.1.4	<ul style="list-style-type: none"> <li>Level gauges shall be rated as follows shown in specification.</li> <li>Level gauges shall have top and bottom connections, standard fixed flange; two switch modules (part number 85350) and EPDM gasket.</li> <li>Both the level indicator/switch assemblies must be provided by Gems Sensors (Gems part number 817032 Sure Site Visual Indicators and Gems part number 85350 Level Switches or government approved equal).</li> </ul>			

## Reagent Supply Subsystem Instrumentation Specification

### EDS Reagent Supply Subsystem Instrumentation Specification (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
2.1.5	<ul style="list-style-type: none"> <li>The transmitter shall be hermetically sealed, 316 SS construction, bonded foil strain gauge type pressure transmitter designed to read 0 to 1,500 psig.</li> <li>The pressure transmitter shall be a Stellar Technologies P/N ST1550-1500A-129 or government approved equal.</li> <li>It must have proof pressure of 1.5 times this pressure range and burst pressure of 3 times this range. The transmitter must provide 4-20 ma output for 0 to 1,500 psig.</li> <li>The pressure transmitter shall be a Stellar Technologies part number ST1550-1500G-129 or government approved equal.</li> </ul>			
2.1.6	<ul style="list-style-type: none"> <li>The sensor shall be fabricated with a 316 SS housing with 30-mm diameter cable, 50 mm long.</li> <li>It must have 15-mm sensing range with 20 to 250 VAC/VDC, 300 milliampere switch rating.</li> <li>The proximity sensor shall be a Netzdrossel part number 3RG4024-OKB60 or government-approved equal.</li> </ul>			

Notes:

<sup>a</sup> Checklist based on Section 2020 Reagent Supply Subsystem Instrumentation Specification dated 08/01/2006.

EPDM = ethylene propylene diene monomer  
ma = miliampere  
mm = millimeter  
NEMA = National Electrical Manufacturers Association

psig = pounds per square inch gauge  
SS = stainless stell  
VAC = volts alternating current  
VDC = volts direct current



## Reagent Supply Subsystem Mechanical Specification

### EDS Reagent Supply Subsystem Mechanical Specification

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
2.1.1	<ul style="list-style-type: none"> <li>Tank shall be 24-inch outside diameter, 65-gallon capacity, type 304 stainless steel per ASME specification SA-240, and designed for a maximum working pressure of 60 psi at 212°F.</li> <li>Tank construction and testing shall be in accordance with the ASME Boiler and Pressure Bessel Code, ASME VIII Div 1.</li> <li>Tanks shall be dished bottom and top, supported by four 4-inch schedule 40 pipe legs to provide 18-inch clearance between tank bottom and floor.</li> <li>Nozzle location and tank construction shall be per Alloy Products Corporation Drawing Number C501-6151-00.</li> </ul>			
2.1.2	<ul style="list-style-type: none"> <li>The water and reagent supply pumps shall be M-03 sealed Hydra Cell pump part number MO3EASESSECJ, maximum flow 2.2 gpmat 1750 rpm, 250 psi maximum inlet pressure, variable pressure to 1,200 psi, 1/2-inch NPT inlet port, 3/8-inch NPT discharge port, 5/8-inch shaft diameter, direct drive, 316 stainless steel pumping head, EPDM diaphragm and O-ring material, 316 stainless steel valve material, Elgiloy valve springs, Celcon valve spring retainers, designed for 20 wt. EPD compatible oil.</li> <li>The pump motor shall be a Gast 4AM-NRV-70C air motor, maximum pressure 100 psi, 3,000 rpm maximum speed, 1.7 horsepower.</li> </ul>			

## Reagent Supply Subsystem Mechanical Specification

### EDS Reagent Supply Subsystem Mechanical Specification (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
2.1.3	<ul style="list-style-type: none"> <li>The pan pump shall be a Versamatic bolted double diaphragm pump, model no E5SP5T559, 0-14 gpm, 1/2-inch NPT inlet, 1/2-inch NPT discharge, stainless steel housing, polypropylene center section, Teflon<sup>®</sup> diaphragms, Teflon<sup>®</sup> valve balls, and Teflon<sup>®</sup> valve seat material and seat O-rings.</li> <li>The air inlet and exhaust ports shall be both 3/8-inch NPT.</li> <li>The maximum air supply pressure shall be 100 psi.</li> </ul>			
2.1.4	<ul style="list-style-type: none"> <li>The water and reagent source pump shall be a Versamatic bolted double diaphragm pump, model No. E5SP5T559, 0-14 gpm, 1/2-inch NPT inlet, 1/2 -inch NPT discharge, stainless steel housing, polypropylene center section, Teflon<sup>®</sup> diaphragms, Teflon<sup>®</sup> valve balls, and Teflon<sup>®</sup> valve seat material and seat O-rings.</li> <li>The air inlet and exhaust ports shall be both 3/8-inch NPT.</li> <li>The maximum air supply pressure shall be 100 psi.</li> </ul>			
2.1.5	<ul style="list-style-type: none"> <li>The vacuum pump shall be a Cole Parmer corrosion-resistant diaphragm vacuum/pressure pump, 1.2 cfm free-air capacity, 27 inch Hg, maximum pressure 60 psi, port size 1/4 inch NPTF 105°F maximum temperature, continuous duty cycle, Teflon<sup>®</sup>/stainless steel wetted parts, with TEFC motor, 115, 50/60 Hz.</li> </ul>			

## Reagent Supply Subsystem Mechanical Specification

### EDS Reagent Supply Subsystem Mechanical Specification (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
3.2	<ul style="list-style-type: none"> <li>Stainless steel tubing shall be fabricated, installed, and tested in accordance with the referenced engineering drawings, EDS phase 2 General Piping Specifications and applicable codes and standards.</li> <li>Pumps shall be installed per manufacturer's installation instructions.</li> <li>Double diaphragm pumps shall be mounted in a vertical position with flexible coupling on both the intake and discharge connections to reduce vibration to the pump and piping.</li> <li>Before any pump is operated, sump and piping system shall be cleaned and flushed to remove debris and foreign material.</li> <li>Contractor shall check to make sure all safety shut off valves, regulators, pressure relief valves, and gauges are working properly before starting pumps.</li> <li>Check valves shall be inspected for proper location and orientation prior to operating pumps.</li> <li>The air supply pressure to the Hydracell pumps and the double diaphragm pumps shall not exceed 100 psi.</li> <li>All equipment shall be properly lubricated before operation.</li> </ul>			

Notes:

<sup>a</sup> Checklist based on Section 2030 Reagent Supply Subsystem Mechanical Specification dated 08/01/2006.

ASME = American Society of Mechanical Engineers  
 cfm = cubic feet per minute  
 EDS = Explosive Destruction System

## Reagent Supply Subsystem Mechanical Specification

### EDS Reagent Supply Subsystem Mechanical Specification (Continued)

Notes: (Continued)

EPDM	=	ethylene propylene diene monomer
gpm	=	gallons per minute
Hz	=	hertz
NPT	=	National Pipe Thread
NPTF	=	National Pipe Thread Female
psi	=	pounds per square inch
rpm	=	revolutions per minute

## Waste Transfer Subsystem Electrical Specification

### EDS Waste Transfer Subsystem Electrical Specification

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
2.1	<ul style="list-style-type: none"> <li>For materials and equipment, use only the latest design and standard products of established manufacturers.</li> <li>For uniformity, only one manufacturer is acceptable for each type of product.</li> <li>Individual parts must be manufactured to standard sizes and gauges so repair parts can be installed in the field.</li> </ul>			
2.2	<ul style="list-style-type: none"> <li>The burst disc, located in a flanged line connected to the waste drums, shall have a 1-foot extension cable that connects to the reagent platform power panel.</li> </ul>			
2.3	<ul style="list-style-type: none"> <li>The waste drums shall be grounded at all times during operation of the unit. Refer to engineering drawing A72650-P2.</li> </ul>			

## Waste Transfer Subsystem Electrical Specification

### EDS Waste Transfer Subsystem Electrical Specification (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
3.1	<ul style="list-style-type: none"> <li>When a deviation from the standards designated in the specifications and drawings is required, the proposed specifications for materials and equipment must have government approval from the Contracting Officer Technical Representative (COTR). Deviation requests must be submitted prior to making any changes.</li> <li>The as-built drawings shall be a record of the construction as installed. The drawings shall include all the information shown on the contract drawings, deviations, modifications, and changes from the contract drawings, however minor. The as-built drawings shall be kept on the job site and updated daily.</li> <li>The as-built drawings shall be a full sized set of prints marked to reflect all deviations, changes and modifications.</li> <li>The as-built drawings shall be complete and show location, size, dimensions, part identification, and other information. Additional sheets may be added as needed.</li> </ul>			

Note:

<sup>a</sup> Checklist based on Section 3010 Waste Transfer Subsystem Electrical Specification dated 08/01/2006.

## Waste Transfer Subsystem Mechanical Specification

### EDS Waste Transfer Subsystem Mechanical Specification

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
2.1.1	<ul style="list-style-type: none"> <li>Swagelok carbon-filled Teflon hose shall be constructed with 304 stainless steel (SS) overbraid, 303 SS sleeve, 316 SS collar with 316 SS end connections and inside hose diameter (ID), as specified on the waste transfer subsystem engineering drawings. Refer to Section 3030, Part 3, Specification 3.1 for a list of associated drawings.</li> <li>Hose working pressure at 70°F is 2,000 psi for 13/32 inch ID hose; 1,500 psi for 5/8 inch ID hose; and 1,000 psi for 7/8 inch ID hose.</li> <li>Hoses shall be pressure tested 30 to 60 seconds at 1.5 times the working pressure to a requirement of no leakage at ambient temperature.</li> </ul>			
2.1.2	<ul style="list-style-type: none"> <li>The Fike Corporation AD-BI 2 rupture disc shall be a 2 inch, two-way disc with 10 psig low burst pressure. The rupture disc shall consist of an integral burst disc indicator, 18 inch lead wire with weatherproof connector and non-asbestos gaskets attached on both sides of the disc.</li> <li>The rupture disc shall be flat and mount between standard 2 inch American National Standards Institute (ANSI) 150 lb companion flanges.</li> </ul>			
3.2	<ul style="list-style-type: none"> <li>Hose shall have the drawing number stamped on the hose for identification.</li> </ul>			

## **Waste Transfer Subsystem Mechanical Specification**

### **EDS Waste Transfer Subsystem Mechanical Specification (Continued)**

Notes:

<sup>a</sup> Checklist based on Section 3030 Waste Transfer Subsystem Mechanical Specifications dated 08/01/2006.

psi = pounds per square inch



## Clamp Hanger Subsystem Electrical Specification

### EDS Clamp Hanger Subsystem Electrical Specification

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
2.1	<ul style="list-style-type: none"><li>For materials and equipment, use only the latest design and standard products of established manufacturers.</li><li>For uniformity, only one manufacturer is acceptable for each type of product.</li><li>Individual parts must be manufactured to standard sizes and gauges so repair parts can be installed in the field.</li></ul>			
2.2	<ul style="list-style-type: none"><li>The stepper motor shall be from Superior Electric, part number KMT093F14.</li><li>The drive shall be from Superior Electric, part number SS2000D61. The drive is a packaged motor controller with an XWC external wiring card attached to the drive.</li></ul>			

## Clamp Hanger Subsystem Electrical Specification

### EDS Clamp Hanger Subsystem Electrical Specification (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
2.3	<ul style="list-style-type: none"> <li>The clamp hanger drive system control panel shall be from Hoffman, part number CSD24248EMCSS.</li> <li>The back panels installed in the panel enclosures shall be from Hoffman, part number CP2424.</li> <li>The small enclosure attached to the back of the clamp hanger drive system control panel shall be Hoffman part number LHC151512SS.</li> <li>The clamp hanger drive motor cable shall be connected to the top of the enclosures in accordance with associated engineering drawings, via a 5-pin male connector.</li> <li>The hose docking station panel shall be mounted to the trailer supports with the mounting angles in accordance with drawing A71108.</li> <li>The hose docking station panel shall contain proximity sensors for the supply, vacuum, vessel effluent, leak detector, and tensioner pump hoses. The proximity switches shall be covered with a Teflon bar. The Teflon bar shall be modified according to the sensor support drawing.</li> </ul>			
2.4	<ul style="list-style-type: none"> <li>The clamp hanger drive pendent shall plug into the left side of the hose docking panel, and shall have a 6-ft cable with a 90° 5-pin male connector.</li> </ul>			

## Clamp Hanger Subsystem Electrical Specification

### EDS Clamp Hanger Subsystem Electrical Specification (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
2.5	<ul style="list-style-type: none"> <li>The proximity sensors shall be interlocked with the electric drive.</li> <li>The proximity sensors shall be from McMaster-Carr, part number 7486K36. The proximity switches are provided with a sensor, and a 1/2-inch SWAG to 1/2-inch MNPT male connector from Swagelok, part number SS-801-1-12. Refer to drawing A71691.</li> <li>Each proximity switch shall route back to an enclosure mounted on the clamp hanger support structure via metallic flex.</li> </ul>			

## Clamp Hanger Subsystem Electrical Specification

### EDS Clamp Hanger Subsystem Electrical Specification (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
3.1	<ul style="list-style-type: none"> <li>When a deviation from the standards designated in the specifications and drawings is required, the proposed specifications for materials and equipment must have government approval from the Contracting Officer Technical Representative (COTR). Deviation requests must be submitted prior to making any changes.</li> <li>The as-built drawings shall be a record of the construction as installed. The drawings shall include all the information shown on the contract drawings, deviations, modifications, and changes from the contract drawings, however minor. The as-built drawings shall be kept on the job site and updated daily.</li> <li>The as-built drawings shall be a full sized set of prints marked to reflect all deviations, changes, and modifications.</li> <li>The as-built drawings shall be complete and show location, size, dimensions, part identification, and other information. Additional sheets may be added as needed.</li> </ul>			

Note:

<sup>a</sup> Checklist based on Section 4010 Clamp Hanger Subsystem Electrical Specification dated 08/01/2006.

## Clamp Hanger Subsystem Mechanical Specification

### EDS Clamp Hanger Subsystem Mechanical Specification

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
2.1.2	<ul style="list-style-type: none"> <li>The clamp hanger subsystem component fabrication and installation shall be in accordance with the EDS Phase 2 General Mechanical Specifications, associated contract drawings, and all applicable codes.</li> </ul>			
2.1.3	<ul style="list-style-type: none"> <li>The clamp hanger assembly shall be an ACME screw assembly consisting of a 304 stainless steel (SS) 1.5 inch diameter x 0.200 inch lead screw (left-hand thread opposite the motor end and right-hand thread on the motor end), 303 SS coupling, chrome plated steel rigid bearing housings, and a National Electrical Manufacturers Association (NEMA) 34 motor mount as shown on Linear Industries drawing 204951 Sheets 1 and 2, Rev. 3.</li> <li>The overall length of the assembly without the motor shall be 93.062 inches, and the distance between the rigid bearing housings is 78.250 inches.</li> </ul>			
2.1.4	<ul style="list-style-type: none"> <li>The clamp hanger shaft shall be a 4-inch outside diameter (OD) case hardened shaft, 101.75 inches long and chrome plated with ends annealed.</li> </ul>			

## Clamp Hanger Subsystem Mechanical Specification

### EDS Clamp Hanger Subsystem Mechanical Specification (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
3.2	<ul style="list-style-type: none"><li>• Clamp hanger components shall be installed in accordance with the detail drawings and descriptive data for each item, and as specified.</li><li>• Clamp hanger fabrication and installation shall be accomplished by workers skilled in this type of work.</li><li>• Templates and patterns shall be used for proper fitting of hardware and accessories and assist in alignment wherever practical.</li><li>• When the mechanical installation of the clamp hanger has been completed, the operation of the hanger shall be checked manually (via the hand wheel) for proper operation prior to mounting the electric motor. The clamp assemblies must ride freely throughout the whole length of the lead screw and shaft during manual operation.</li><li>• The clamp assembly shall be properly lubricated prior to manual or motorized operation of the clamp hanger.</li></ul>			

Notes:

<sup>a</sup> Checklist based on Section 4030 Clamp Hanger Subsystem Mechanical Specification dated 08/01/2006.

EDS = Explosive Destruction System

## Electrical Subsystem Specifications

### EDS Electrical Subsystem Specifications

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
2.1.1	<ul style="list-style-type: none"> <li>The distribution panel board (DP1) shall be 18 circuits, 250 Amps, fully rated, 480 volts, 3-phase, 3-wire, copper bus, 14K AIC from Cutler-Hammer type PRL-3a.</li> <li>The main breaker in DP1 shall be a 175 Amp, 480 VAC from Cutler-Hammer, part number HFD3175.</li> <li>DP1 shall contain the following 480 VAC branch circuit breakers from Cutler-Hammer: 20 Amps (HFD3020)); 30 Amps (HFD3030); 40 Amps (HFD3040); 70 Amps (HFD3070).</li> <li>The shunt trip in DP1 shall be 48 to 127 VAC from Cutler-Hammer, part number SNTIRP08K.</li> <li>Three current transformers are required to monitor power on DP1. The transformers shall be 600 VAC, 50 to 400 Hz, 300 to 5 ratio from Electro Industries, part number 16RBT-301.</li> <li>The distribution panel board (DP2) shall be 18 circuits, 250 Amps main lug, fully rated, 480 volts, 3-phase, 3-wire, copper bus, 14K AIC from Cutler-Hammer type PRL-3a.</li> <li>DP2 shall contain the following 480 VAC branch circuit breakers from Cutler-Hammer: four 20 Amps (HFD3020)); two 50 Amps (HFD3050).</li> <li>The distribution panel board (DP3) shall be 42 circuits, 100 Amps, fully rated, 208/120 volts, 3-phase, 4-wire, copper bus, 22K AIC from Cutler-Hammer type PRL-1a.</li> </ul>			

## Electrical Subsystem Specifications

### EDS Electrical Subsystem Specifications (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
	<ul style="list-style-type: none"> <li>The main breaker in DP3 shall be a 100 Amp, 208/120 VAC, 3-pole, 120 VAC shunt trip from Cutler-Hammer, part number QBHW3100HS.</li> <li>DP3 shall contain the following 208/120 VAC branch circuit breakers from Cutler-Hammer: 20 Amps, 3-pole (QBHW3020); 29 20 Amps, 1-pole (QBHW1020).</li> <li>Three current transformers are required to monitor power on DP3. The transformers shall be 600 VAC, 50 to 400 Hz, 100 to 5 ratio from Electro Industries, part number 16RBT-101.</li> <li>The distribution panel board (DP4) shall be 42 circuits, 100 Amps, fully rated, 208/120 volts, 3-phase, 4-wire, copper bus, 22K AIC from Cutler-Hammer type PRL-1a.</li> <li>The main breaker in DP4 shall be a 100 Amp, 208/120 VAC, 3-pole, 120 VAC shunt trip from Cutler-Hammer, part number QBHW3100H.</li> <li>DP4 shall contain the following 208/120 VAC branch circuit breakers from Cutler-Hammer: twenty-one 20 Amps (QBHW1020), 30 Amps, 1-pole (QBHW1030); two 60 Amps, 3-pole (QBHW3060).</li> <li>DP4 shall contain the following watertight receptacles with twist lock and safety shroud: two 20 Amp, 125 VAC, 1HP, NEMA L5-20R from Hubbell, part number HBL2610SW; 30 Amp, 125 VAC, 2 HP, NEMA L5-30R from Hubbell, part number HBL2610SW.</li> </ul>			



## Electrical Subsystem Specifications

### EDS Electrical Subsystem Specifications (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
	<ul style="list-style-type: none"> <li>Panel board enclosures shall be rated NEMA 4x stainless steel. The N4X2436 enclosures shall be fabricated to fit panel board chassis as noted on the drawings.</li> </ul>			
2.1.2	<ul style="list-style-type: none"> <li>Power conditioners PC1 and PC2 shall provide the ELC with three phase power, voltage sag protection, noise filtration, and surge and spike protection. The power conditioners shall be equipped with an internal 30KVA transformer connected delta/wye, 480 VAC input, 208/120 VAC output, 60 Hz.</li> <li>Both power conditioners shall have three diagnostic lights on the front panel and a remote relay alarm. Refer to specification for status indicator light function.</li> <li>The power conditioners shall be a Sola catalog number 63TCA330, redesign numbers 6145001T00, US160401 and US160402, or government approved equal.</li> </ul>			
2.1.2.1	<ul style="list-style-type: none"> <li>The power conditioner enclosure body shall be fabricated in accordance with drawing A73759. The enclosure shall be fabricated from 14 GA x 42 1/2 inches x 8 feet 4 inches, 304 stainless steel sheet.</li> </ul>			

## Electrical Subsystem Specifications

### EDS Electrical Subsystem Specifications (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
	<ul style="list-style-type: none"> <li>The power conditioner enclosure front panel shall be fabricated in accordance with drawing A73758. The enclosure shall be fabricated from 14 GA x 34 inches x 3 feet 7 inches, 304 stainless steel sheet. Attached to the front panel shall be a spring loaded draw latch from Southco, part number K5-2856-52 or government approved equal.</li> <li>The power conditioner lid assembly shall be fabricated in accordance with drawing A73756. Refer to specification for a detailed list of equipment required for the power conditioner lid assembly, and associated drawings.</li> <li>The access panel shall be fabricated in accordance with drawing A71046. The access panel shall be fabricated from 14 GA x 16 7/8 inches x 2 feet 4 5/8 inches, 304 stainless steel sheet.</li> <li>Installation of conduit, knockouts and wiring shall be in accordance with drawing A74387. Wiring electrical components shall be in accordance with drawings A74360 and A74361.</li> <li>The front panel window shall be fabricated in accordance with drawing A73761. The window shall be clear polycarbonate, 1/8 inch x 5 inches x 7 inches (Lexan) with a spring loaded draw latch, Southco, part number K5-2856-52.</li> </ul>			

## Electrical Subsystem Specifications

### EDS Electrical Subsystem Specifications (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
	<ul style="list-style-type: none"> <li>The mounting rails shall be fabricated in accordance with drawing A71047. The mounting rails shall be 2 inches x 4 inches x 2 feet 4 1/2 inches, 304 SS.</li> <li>The power conditioner floor shall be fabricated in accordance with drawing A73760. The floor shall be 1/4 inch x 33 1/4 inches x 2 feet 11-1/4 inches, 304 stainless steel plate.</li> </ul>			
2.1.3	<ul style="list-style-type: none"> <li>The vessel control panel shall be from Hoffman, part number C-SD363612SS and shall meet the following criteria: 36 inches x 36 inches x 12 inches 304 stainless steel. The back panel shall be a Hoffman, part number C-P3636SS.</li> </ul>			
2.1.3.1	<ul style="list-style-type: none"> <li>Mounted on the vessel control panel door shall be the emergency process shutdown button, switches, indicator lights, and PID temperature/process controllers. The arrangement of these components shall be in accordance with drawing A70743.</li> <li>The three temperature/process controllers shall be microprocessor based 1/16 DIN with universal input, 120 VAC, 4 to 20 ma outputs, NEMA 4x from Watlow Series, part number 96A1-FFDU-00GR.</li> <li>The emergency process shutdown button shall be a 30.5 mm, type 4/13, 2-position push button, red illumination, jumbo head mushroom, push-pull from Allen-Bradley, part number 800T-FX-JQ1 ORA 1.</li> </ul>			

## Electrical Subsystem Specifications

### EDS Electrical Subsystem Specifications (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
	<ul style="list-style-type: none"> <li>On the vessel control panel there shall be four selector switches from GE, part number CR104PSL21M11S2. The selector switches shall meet the following criteria: amber illumination, full voltage, maintained; 1NO &amp; 1NC contact, LED, 120 VAC.</li> <li>On the vessel control panel there shall be seven push buttons from GE, part number CR104PBL11G3L2. The push buttons shall meet the following criteria: green illumination, full voltage, maintained; 1NO &amp; 1NC contact, LED with guard, 120 VAC.</li> <li>On the vessel control panel there shall be a push button indicator from GE, part number CR104PBL11M3L2. The push button indicator shall meet the following criteria: amber illumination, full voltage, maintained; 1NO &amp; 1NC contact, LED with guard, 120 VAC.</li> <li>On the vessel control panel there shall be five push button indicators from GE, part number CR104PBL11R3L2. The push button indicators shall meet the following criteria: red illumination, full voltage, maintained; 1NO &amp; 1NC contact, LED with guard, 120 VAC.</li> <li>On the vessel control panel there shall be two push button indicators from GE, part number CR104PBL11W3L2. The push button indicators shall meet the following criteria: white illumination, full voltage, maintained; 1NO &amp; 1NC contact, LED with guard, 120 VAC.</li> </ul>			

## Electrical Subsystem Specifications

### EDS Electrical Subsystem Specifications (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
2.1.3.1	<ul style="list-style-type: none"> <li>On the vessel control panel there shall be three indicator lights from GE, part number CR104PLT82G. The indicator lights shall meet the following criteria: push to test, green illumination, full voltage, maintained; 1NO &amp; 1NC contact, LED, 120 VAC.</li> <li>On the vessel control panel there shall be indicator lights from GE, part number CR104PLT82R. The indicator lights shall meet the following criteria: push to test, red illumination, full voltage, maintained; 1NO &amp; 1NC contact, LED, 120 VAC.</li> <li>On the vessel control panel there shall be indicator lights from GE, part number CR104PLT82M. The indicator lights shall meet the following criteria: push to test, amber illumination, full voltage, maintained; 1NO &amp; 1NC contact, LED, 120 VAC.</li> <li>On the vessel control panel there shall a selector switch from GE, part number CR104PSK34A92C02. The selector switch shall meet the following criteria: non-illuminated, key operated, 3-position, maintained, 2NO &amp; 2NC contacts.</li> <li>On the vessel control panel there shall a selector switch from GE, part number CR104PSK21A92M. The selector switch shall meet the following criteria: non-illuminated, key operated, 2-position, maintained, 2NO &amp; 2NC contacts.</li> </ul>			

## Electrical Subsystem Specifications

### EDS Electrical Subsystem Specifications (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
	<ul style="list-style-type: none"> <li>On the vessel control panel there shall a 9-pin straight female receptacle from Brad Harrison, part number 3R004A20A061, and a 3-pin straight female receptacle, part number 1R3D04A25M020.</li> </ul>			
2.1.3.2	<ul style="list-style-type: none"> <li>The vessel control panel chassis assembly shall include the power supply, relays, and signal conditioner. The arrangement of these components shall be in accordance with drawing A70743.</li> <li>The power supplies shall have a front panel indicator, 115 VAC input, 24 VDC output, 2.5 Amps output. The power supply shall be a PULS, part number SL2.100.</li> <li>Two relays shall be plug-in type, light indicator, blade type terminal, 4PDT contact, 24 VDC, from IDEC, part number RY4S-UL DC 24V.</li> <li>Twelve relays shall be plug-in type, light indicator, blade type terminal, 4PDT contact, 120 VAC, 5 Amp contact rating, from IDEC, part number RY4S-UL AC 110-120.</li> <li>The signal conditioner shall be a Pico Pak 1/11 from Weidmiller, part number 998301.</li> </ul>			

## Electrical Subsystem Specifications

### EDS Electrical Subsystem Specifications (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
2.1.4	<ul style="list-style-type: none"> <li>The heater control panel shall be from Hoffman, part number C-TD366012, with an enclosure back panel, part number C-P6036. The size of the heater power panel shall be 3 feet x 5 feet x 1 foot with a dual door. The enclosure back panel shall be 58.2 inches x 34.2 inches.</li> <li>The battery indicator mounted on the front door of the heater power panel shall be a single battery bank monitor, digital numerical multi-color display with 500 Amp shunt, flush mount splash resistant front panel, Xantrex part number 84-2016-01 Link 10 standard. Mounted on the side of the heater panel enclosure shall be a small drop-in cabinet cooler, 120 VAC, 0.4 Amps, 60 Hz with 2 washdown fan units, Noren part number CC200.</li> <li>The equipment required for the heater power panel chassis assembly shall include SCR power controllers, relays, terminal blocks, current transformers, electric heater, thermostat and fuse holders. The arrangement of all electrical components shall be in accordance with drawing A69803.</li> <li>On the heater power panel, the SCR solid state power controllers shall be from Watlow, part number DC21-60F0-S000 and shall meet the following criteria: 3-phase, fan cooled, 120 VAC, 277 to 600 VAC line voltage, 4 to 20 ma input signal.</li> </ul>			

## Electrical Subsystem Specifications

### EDS Electrical Subsystem Specifications (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
	<ul style="list-style-type: none"> <li>On the heater power panel, four relays shall be plug-in type, light indicator, blade type terminal, 4PDT contact, 5 Amp, 120 VAC, from IDEC, part number RY4S-UL AC. 110-120.</li> <li>On the heater power panel, eight relays shall be plug-in type, light indicator, blade type terminal, 4PDT contact, 24 VDC, from IDEC, part number RY4S-UL DC 24V.</li> <li>The sockets shall be finger safe din rail mount from IDEC, part number SY4S-05C.</li> <li>The current transformers (CT) shall be from Bender, part number W1-S35 and shall meet the following criteria: 1 3/8 inch internal diameter, burden rating 180 Ohms. 600 to 1 ratio, ground fault sensing, 10 Amps and ground fault overload capacity of 20 Amps.</li> <li>The electric heater shall be from Hoffman, part number DAH1001A, and shall be 115 VAC, 100W, 0.9 Amps.</li> <li>The thermostat shall be from Hoffman, part number ATEMNO.</li> </ul>			
2.1.5	<ul style="list-style-type: none"> <li>The drive power panel shall be from Hoffman, part number C-SD363012, and shall be 36 inches x 30 inches x 12 inches, NEMA 4 enclosure.</li> <li>The enclosure back panel shall be from Hoffman part number C-P3630 and with dimensions of 34.2 inches x 28.2 inches.</li> </ul>			



## Electrical Subsystem Specifications

### EDS Electrical Subsystem Specifications (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
	<ul style="list-style-type: none"> <li>The equipment required for the drive power panel chassis assembly shall include the variable frequency drive (VFD), drive line filter, resistor brake, drive line choke, overload, power supply, electric heater, thermostat, and relays. The arrangement of all electrical components shall be in accordance with drawing A69800.</li> <li>The VFD shall be from SEW-Eurodrive, part number 8264821 or a government approved equal that meets the following criteria: 2.2 Kw, 460 V, 3 HP, 4.3 Amps.</li> <li>On the drive power panel, the drive line filter, part number NF008-503 and the resistor brake, part number BW100-005 shall be from SEW-Eurodrive. The drive line choke shall be from Netzdrossel, part number ND020-103.</li> <li>The power supply shall have a front panel indicator, 115 VAC input, 24 VDC output, 2.5 Amps output. The power supply shall be a PULS, part number SL2.100.</li> <li>The electric heater shall be from Hoffman, part number DAH1001A, and shall be 115 VAC, 100W, 0.9 Amps.</li> <li>The thermostat shall be from Hoffman, part number ATEMNO.</li> <li>On the drive power panel, the relay shall be plug-in type, light indicator, blade type terminal, 4PDT contact, 5 Amp, 120 VAC, from IDEC, part number RY4S-UL AC. 110-120.</li> </ul>			

## Electrical Subsystem Specifications

### EDS Electrical Subsystem Specifications (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
	<ul style="list-style-type: none"> <li>On the drive power panel, the relay shall be plug-in type, light indicator, blade type terminal, 4PDT contact, 5 Amp, 24 VDC, from IDEC, part number RY4S-UL DC 24V.</li> <li>The sockets shall be finger safe din rail mount from IDEC, part number SY4S-05C.</li> </ul>			
2.1.6	<ul style="list-style-type: none"> <li>The process control panel shall be from Hoffman, part number C-SD363012SS, and shall be 36 inches x 30 inches x 12 inches, 304 SS with an enclosure back panel 34.2 inches x 28.2 inches also from Hoffman, part number C-P3630SS.</li> </ul>			
2.1.6.1	<ul style="list-style-type: none"> <li>Mounted on the process control panel shall be PID temperature/process controllers, audio alarm, and pushbutton switches indicators. The arrangement of the components shall be in accordance with drawing A69797.</li> <li>The PID temperature/process controllers shall be microprocessor based 1/16 DIN with universal input, 120 VAC, 4 to 20 ma outputs, NEMA 4X from Watlow Series 96, part number 96A1-FFDM-00GR.</li> <li>The audio alarm shall be from Floyd Bell, part number XB-V09-201-Q(S) and shall meet the following criteria: 304 SS diaphragm, 30 to 120 VAC, 92 dB at 30 VAC, 103 dB at 120 VAC.</li> </ul>			

## Electrical Subsystem Specifications

### EDS Electrical Subsystem Specifications (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
	<ul style="list-style-type: none"> <li>On the process control panel there shall be three push button switches from GE, part number CR104PBL11R3L2. The push button switches shall meet the following criteria: red illumination, full voltage, 1NO &amp; 1NC contact, LED, 120 VAC.</li> <li>On the process control panel there shall be two push button switches from GE, part number CR104PBL11M3L2. The push button switches shall meet the following criteria: amber illumination, full voltage, 1NO &amp; 1NC contact, LED, 120 VAC.</li> <li>On the process control panel there shall be three push button switches from GE, part number CR104PBL11G3L2. The push button switches shall meet the following criteria: green illumination, full voltage, 1NO &amp; 1NC contact, LED, 120 VAC.</li> <li>On the process control panel there shall be two push button switches from GE, part number CR104PBL11W3L2. The push button switches shall meet the following criteria: white illumination, full voltage, 1NO &amp; 1NC contact, LED, 120 VAC.</li> <li>On the process control panel there shall be a push button switch from GE, part number CR104PBL11B3L2. The push button switch shall meet the following criteria: blue illumination, full voltage, 1NO &amp; 1NC contact, LED, 120 VAC.</li> </ul>			

## Electrical Subsystem Specifications

### EDS Electrical Subsystem Specifications (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
	<ul style="list-style-type: none"> <li>On the process control panel there shall be five indicator lights from GE, part number CR104PLT82R. The indicator lights shall meet the following criteria: red illumination, full voltage, press to test, LED, 120 VAC.</li> <li>On the process control panel there shall be two indicator lights from GE, part number CR104PLT82M. The indicator lights shall meet the following criteria: amber illumination, full voltage, press to test, LED, 120 VAC.</li> </ul>			
2.1.6.2	<ul style="list-style-type: none"> <li>In the process control panel assembly, the power supply shall have a front panel indicator, 115 VAC input, 24 VDC output, 2.5 Amps output. The power supply shall be a PULS, part number SL2.100.</li> <li>In the process control panel assembly, nine relays shall be plug-in type, light indicator, blade type terminal, 4PDT contact, 5 Amp, 120 VAC, from IDEC, part number RY4S-UL AC 110-120.</li> <li>In the process control panel assembly, seven relays shall be plug-in type, light indicator, blade type terminal, 4PDT contact, 5 Amp, 24 VDC, from IDEC, part number RY4S-UL DC 24V.</li> <li>The sockets shall be finger safe din rail mount from IDEC, part number SY4S-05C.</li> </ul>			

## Electrical Subsystem Specifications

### EDS Electrical Subsystem Specifications (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
	<ul style="list-style-type: none"> <li>The signal splitter transmitter shall be from Acroma, part number 612T and shall be dual I/O channels, 10 to 36 VDC, 0 to 20 ma output, 0 to 10 VDC output.</li> </ul>			
2.1.7	<ul style="list-style-type: none"> <li>The utility panel shall be from Hoffman, part number C-SD363012SS, and shall be 36 inches x 30 inches x 12 inches, 304 SS with an enclosure back panel, 34.2 inches x 28.2 inches Hoffman part number C-P3630SS.</li> </ul>			
2.1.7.1	<ul style="list-style-type: none"> <li>The equipment required for the utility panel door shall include power monitoring panels, ground fault monitoring indicators, elapsed timer, RF link status, hanger stored indicator light, vessel temperature limit, and the power conditioner cooling alarm indicators. The arrangement of all the components shall be in accordance with drawing A71962.</li> </ul>			

## Electrical Subsystem Specifications

### EDS Electrical Subsystem Specifications (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
	<ul style="list-style-type: none"> <li>The power monitors shall be from Electro Industries, part number DMMS300-3E-V-A-KW-G-115A and DMMS300-3E-V-A-KW-120-115A. The monitors shall accept input from standard instrument transformers (5A secondary current transformers and 120 volt secondary potential transformers). The monitors shall accept a voltage monitoring range of up to 600 volts, phase to phase and shall have an accuracy of <math>\pm 0.2\%</math> or better for volts and amps, and 0.4% for power functions. The case for the monitors shall be fully encased and shielded.</li> <li>The over-temperature limit controller shall be from Watlow 97 Series, part number 97B1-DDAU-00GR. The controller shall be a microprocessor based, 1/16 DIN with universal input, 24 V, RS-485 communications, green/red four digit display.</li> <li>The Apollo real-time clock shall be from Red Lion controls, part number APLCK000, and shall meet the following criteria: 6 digit LED display, 115 VAC, 60 Hz.</li> <li>The digital input panel meter shall be from Veeder-Root, part number C628-60000 and shall meet the following criteria: primary display 5 digits, panel mounted, accepts 90 to 264 VAC, elapsed timer shall be a red/green seven segment LED.</li> </ul>			

## Electrical Subsystem Specifications

### EDS Electrical Subsystem Specifications (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
	<ul style="list-style-type: none"> <li>The receiver antenna shall be an Omnex, part number 1214-01.</li> <li>On the utility panel door there shall be two indicator lights from GE, part number CR104PXL07R, and CR104PXL07G. The indicator lights shall be one red and one green illumination and press to test.</li> <li>On the utility panel door there shall be two push button switches from GE, part number CR104PBL11R1L2, and CR104PBL11G1L2. The push button switches shall meet the following criteria: full voltage, 1NO &amp; 1NC contact, LED, 120 VAC.</li> <li>On the utility panel door there shall be two indicator lights from Ledtronics, part number BF3127-0AG-120A. The indicator lights shall meet the following criteria: green illumination, 5 Amp, 120 VAC.</li> <li>On the utility panel door there shall be five indicator lights from Ledtronics, part number BF3127-0UR-120A. The indicator lights shall meet the following criteria: red illumination, 120 VAC.</li> </ul>			
2.1.7.2	<ul style="list-style-type: none"> <li>The equipment mounted inside the utility chassis panel shall include the 24 V power supply, fault evaluator monitor, relays monitor, RF receiver, RF power supply and relays. The arrangement of all electrical components shall be in accordance with drawing A71977.</li> </ul>			

## Electrical Subsystem Specifications

### EDS Electrical Subsystem Specifications (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
	<ul style="list-style-type: none"> <li>The power supply shall be from Sola/Hevi-Duty, part number SDN-2.5-24-100 and shall be a DIN Rail series, 115/230 VAC input, 24 VDC output, 2.5 Amps.</li> <li>The insulation fault evaluator monitor shall be from Bender, part number EDS-470-12, and shall have up to 12 measuring current transformer inputs, LED alarm, RS-485 interface, response value of 5 ma.</li> <li>The current monitor shall be from Bender, part number RCMS-470-12, and shall have up to 12 measuring current transformer inputs, LED alarm, RS-485 interface, 10 ma to 10 Amps response range.</li> <li>A 3-phase monitor relay shall be from Crouzet, part number 84873010, and shall meet the following criteria: front dial settings; upper dial for three phase nominal voltage setting; lower dial for adjustable time delay; DIN Rail mounted; LED power on and status indication; 480 VAC input; 60 Hz.</li> <li>A 3-phase monitor relay shall be from Crouzet, part number 84873015, and shall meet the following criteria: front dial settings; upper dial for three phase nominal voltage setting; lower dial for adjustable time delay; DIN Rail mounted; LED power on and status indication; 208 VAC input; 60 Hz.</li> <li>The RF receiver REX-900 shall be from Omnex, part number ASSY-1190-02</li> </ul>			



## Electrical Subsystem Specifications

### EDS Electrical Subsystem Specifications (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
	<ul style="list-style-type: none"> <li>The RF power supply shall be from Omega, part number DRN-PS-1000 and shall be 24 VDC, 1.0 Amp.</li> <li>In the utility chassis assembly, the relays shall be plug-in type, light indicator, blade type terminal, 4PDT contact, 5 Amp, 24 VDC, from IDEC, part number RY4S-UL DC 24V.</li> <li>In the utility chassis assembly, the relays shall be plug-in type, light indicator, blade type terminal, 4PDT contact, 5 Amp, 120 VDC, from IDEC, part number RY4S-UL AC 110-120.</li> <li>The relay sockets shall be finger-safe DIN rail mount IDEC part number SY4S-05C.</li> </ul>			
2.1.8	<ul style="list-style-type: none"> <li>The hose docking station panel shall be from Hoffman, part number CSD24248EMCSS, and shall be 24 inches x 24 inches x 8 inches, wall mount EMC, NEMA 4X, stainless steel. The enclosure back panel 22.2 inches x 22.2 inches shall be from Hoffman, part number CP2424G.</li> </ul>			

## Electrical Subsystem Specifications

### EDS Electrical Subsystem Specifications (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
2.1.8.1	<ul style="list-style-type: none"> <li>Mounted on the hose docking station front panel shall be a process shutdown button, the clamp hanger pendent selector switch, the hanger speed selector switch, hanger operation push button indicator, hanger stowed and closed push button indicator, and push button switch indicators for the supply hose, vacuum hose, vessel effluent hose, leak detector hose, and tensioner pump hose. The arrangement of the components shall be in accordance with drawing A73779.</li> <li>The process shutdown button shall be from Allen-Bradley, part number 800T-FXJQ10RA1, and shall meet the following criteria: red illumination; mushroom push button; push-pull 2-position; 30.5 mm; type 4/13.</li> <li>The pendant selector switch shall be from GE, part number CR104PSK34A92C, and shall meet the following criteria: non-illuminated; key operated; 3-position; maintained; 2NO &amp; 2NC contacts.</li> <li>The hanger speed selector switch shall be from GE, part number CR104PSL21M11S2, and shall meet the following criteria: amber illumination; full voltage; maintained; 1NO &amp; 1NC contacts; LED; 120 VAC.</li> </ul>			

## Electrical Subsystem Specifications

### EDS Electrical Subsystem Specifications (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
	<ul style="list-style-type: none"> <li>The hanger operation push button indicators shall be from GE, part number CR104PBL11G3L2, and shall meet the following criteria: green illumination; push button; full voltage; 1NO &amp; 1NC contacts; LED; 120 V.</li> <li>The hanger stow and close push button indicator shall be from GE, part number CR104PBL11G1L2, and shall meet the following criteria: green illumination; push button; full voltage; 1NO &amp; 1NC contacts; LED; 120 V.</li> <li>The push button switch indicators shall be from IDEC, part number ALW29911D-G-120 and shall meet the following criteria: green illumination; full voltage; extended lens; 1NO &amp; 1NC contacts; LED; 120 VAC.</li> </ul>			
2.1.8.2	<ul style="list-style-type: none"> <li>The equipment mounted in the hose docking station chassis assembly shall be the power supplies, proximity sensors, and relays. The arrangement of the electrical components shall be in accordance with drawing A71772.</li> <li>The power supplies shall have a front panel indicator, 115 VAC input, 24 VDC output, and 2.5 Amps output. The power supply shall be a PULS, part number SL2.100.</li> <li>Six relays shall be plug-in type, light indicator, blade type terminal, DPDT contact, 120 VAC, 3 Amp contact rating, from IDEC, part number RY2S-UL AC 110-120.</li> </ul>			

## Electrical Subsystem Specifications

### EDS Electrical Subsystem Specifications (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
	<ul style="list-style-type: none"> <li>Seven relays shall be plug-in type, light indicator, blade type terminal, DPDT contact, 24 VDC, from IDEC, part number RY2S-UL DC 24 V.</li> <li>Eight relays shall be plug-in type, light indicator, blade type terminal, 4PDT contact, 120 VAC, 5 Amp contact rating, from IDEC, part number RY4S-UL AC 110-120.</li> <li>The cable for proximity switch shall be a Siemens, part number 3RG4024-OKB6O, and shall be 30 mm x 54 mm.</li> <li>The proximity switch shall be from McMaster-Carr, part number 7486K36, and shall be a two-wire AC switch, rated at 250 VAC, 1NO contact, 15 mm sensing distance.</li> </ul>			
2.1.9	<ul style="list-style-type: none"> <li>The reagent platform power panel shall be from Hoffman, part number A-30H2008SSLP, and shall be 30 inches x 20 inches x 8 inches, NEMA 4x, 304 SS with an enclosure back panel, from Hoffman part number A-30P20.</li> </ul>			

## Electrical Subsystem Specifications

### EDS Electrical Subsystem Specifications (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
2.1.9.1	<ul style="list-style-type: none"> <li>Refer to drawing A70774 for the mounting locations of Watlow controllers, receptacles, and electrical plugs.</li> <li>The over-temperature limit controller shall be a Watlow 97 Series, part number 97B1-DDAU-00GR, or government approved equal and shall meet the following criteria: microprocessor-based controller, 1/16 DIN with universal input, 24 V, RS-485 communications, green/red four-digit display.</li> <li>Two receptacles shall be a Hubbell, part number GF5252WC and shall be ground fault interrupter (GFI), 20 Amp, 115 VAC.</li> <li>A plug shall be from Amphenol, part number ZREP-16-321 and shall be a square flange receptacle 37-pin plug.</li> <li>A plug shall be from Amphenol, part number ZREP-20-676 and shall be a square flange receptacle 19-pin plug.</li> </ul>			
2.1.10	<ul style="list-style-type: none"> <li>Conduits, cables, and wire ways shall be installed in accordance with drawings A72643, A74429, and A74430.</li> <li>Flexible metallic and nonmetallic conduit shall have plastic grommet for Amor, E-Glass, Hi-Temp, and Thermo-x, part number H603G.</li> <li>Six wire-ways shall be from Hoffman, part number F-66WASS and shall be 6 inches x 6 inches, adjustable telescoping, SS, NEMA 4x.</li> </ul>			

## Electrical Subsystem Specifications

### EDS Electrical Subsystem Specifications (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
	<ul style="list-style-type: none"> <li>One wire-way shall be from Hoffman, part number F-66W12SS and shall be 6 inches x 6 inches, 12-inch straight, flanged, SS, NEMA 4x.</li> <li>Three wire-ways shall be from Hoffman, part number F-66W24SS and shall be 6 inches x 6 inches, 24-inch straight, flanged, SS NEMA 4x.</li> <li>Two wire-ways shall be from Hoffman, part number F-66W36SS and shall be 6 inches x 6 inches, 36-inch straight, flanged, SS, NEMA 4x.</li> <li>One wire-way shall be from Hoffman, part number F-66W48SS and shall be 6 inches x 6 inches, 48-inch straight, flanged, SS, NEMA 4x.</li> <li>One wire-way shall be from Hoffman, part number F-66WE90SS and shall be 6 inches x 6 inches, 90° elbow, flanged, SS, NEMA 4x.</li> <li>Eight wire-ways shall be from Hoffman, part number F-66HBSS and shall be 6 inches x 6 inches, bracket, SS, NEMA 4x.</li> <li>Six wire-ways shall be from Hoffman, part number F-66WGSS and shall be 6 inches x 6 inches, gasket, SS, NEMA 4x.</li> <li>Two wire-ways shall be from Hoffman, part number F-66WTSS and shall be 6 inches x 6 inches, Tee, flanged, SS, NEMA 4x.</li> <li>Two wire-ways shall be from Hoffman, part number F-66WPSS and shall be 6 inches x 6 inches, closure plate, SS, NEMA 4x.</li> </ul>			

## Electrical Subsystem Specifications

### EDS Electrical Subsystem Specifications (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
	<ul style="list-style-type: none"> <li>Five wire-ways shall be from Hoffman, part number F-66WBSS and shall be 6 inches x 6 inches, box connector, SS, NEMA 4x.</li> </ul>			

Note:

<sup>a</sup> Checklist based on Section 5000 Electrical Subsystem Specification dated 08/01/2006.

AC = alternating current  
 AIC = ampere interrupting capacity  
 EDS = Explosive Destruction System  
 GE = General Electric  
 Hz = hertz  
 LED = light-emitting diode  
 NEMA = National Electrical Manufacturers Association  
 SCR = silicon-controlled rectifier  
 SS = stainless steel  
 VAC = volts alternating current  
 VDC = volts direct current  
 VDS = vendor data coordinator

## Helium Supply and Leak Detection Subsystem Electrical Specification

### EDS Helium Supply and Leak Detection Subsystem Electrical Specification

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
2.1	<ul style="list-style-type: none"> <li>For materials and equipment, use only the latest design and standard products of established manufacturers.</li> <li>For uniformity, only one manufacturer is acceptable for each type of product.</li> <li>Individual parts must be manufactured to standard sizes and gauges so repair parts can be installed in the field.</li> </ul>			
2.2	<ul style="list-style-type: none"> <li>The junction box shall be a Hoffman LHC151512SS NEMA 4x. There shall be a gasket installed between the junction box and the leak detector box assembly. The feed for the junction box shall be from the floor to the trailer via conduit.</li> <li>The junction box shall be labeled "120 Volts Leak Detector" and a label for the feed circuit.</li> </ul>			
2.3	<ul style="list-style-type: none"> <li>The receptacle for the junction box shall be a standard single 3-prong, 110 VAC and powered from distribution panel 3, circuit 19.</li> </ul>			



## Helium Supply and Leak Detection Subsystem Electrical Specification

### EDS Helium Supply and Leak Detection Subsystem Electrical Specification (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
3.1	<ul style="list-style-type: none"> <li>When a deviation from the standards designated in the specifications and drawings is required, the proposed specifications for materials and equipment must have government approval from the Contracting Officer Technical Representative (COTR). Deviation requests must be submitted prior to making any changes.</li> <li>The as-built drawings shall be a record of the construction as installed. The drawings shall include all the information shown on the contract drawings, deviations, modifications, and changes from the contract drawings, however minor. The as-built drawings shall be kept on the job site and updated daily.</li> <li>The as-built drawings shall be a full sized set of prints marked to reflect all deviations, changes, and modifications.</li> <li>The as-built drawings shall be complete and show location, size, dimensions, part identification, and other information. Additional sheets may be added as needed.</li> </ul>			

Notes:

<sup>a</sup> Checklist based on Section 6010 Helium Supply and Leak Detection Subsystem Electrical Specification dated 08/01/2006.

NEMA = National Electrical Manufacturers Association

VAC = volts alternating current

## Helium Supply and Leak Detection Subsystem Mechanical Specification

### EDS Helium Supply and Leak Detection Subsystem Mechanical Specification

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
2.1.1	<ul style="list-style-type: none"> <li>The hose shall be Swagelok carbon-filled Teflon with 316 stainless steel connectors. The working pressure for 3/16 inside diameter hose at 70°F is 3,000 psig.</li> <li>Hoses shall be pressure tested 30 to 60 seconds at 1.5 times the working pressure to a requirement of no leakage at ambient temperature.</li> </ul>			
2.1.2	<ul style="list-style-type: none"> <li>The helium leak detector shall be a multipurpose Alcatel ASM 142 series, part number TOR00000B710, with a minimum detectable helium leak of 1.10-11 atm cc/s in vacuum mode, 1.10-7 atm cc/s (with a response time of &lt;1 second) in sniffing mode, and the following criteria: fully automatic; 115 volt; 60 Hz; 10 mbar minimum inlet test pressure; 78 L/min. helium pumping inlet; 7 cfm roughing capacity; auto calibration; built-in temperature compensated; full automation of test cycle; helium background suppression; floating zero (prevents negative signal); and helium pollution prevention.</li> </ul>			

## Helium Supply and Leak Detection Subsystem Mechanical Specification

### EDS Helium Supply and Leak Detection Subsystem Mechanical Specification (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
2.1.3	<ul style="list-style-type: none"> <li>The helium regulator and manifold shall be a Matheson Tri Gas, part number 3816-580 with the following criteria: dual stage high purity; stainless steel (SS); 316 SS bar stock body and diaphragm; metal to metal seals; 316 SS 2 inch pressure gauges; nickel-plated brass bonnets; Kel-F first stage seats; PFA Teflon second stage seats; rated at 3,000 psi maximum regulator inlet pressure; 450 scfh maximum flow rate at 2,500 psig; temperature range -40° to 165°F; and 1/4 inch NPT ports.</li> </ul>			
2.1.4	<ul style="list-style-type: none"> <li>The vacuum hose shall be from Vacuum Products, part number 441208-2000 (96 inches long) and 440113 (36 inches long) and meet the following criteria: braided stainless steel; 1 inch outside diameter; 0.009 inch wall thickness; 4.25 inch static bend radius; spring rate 18; and SS vacuum flanges on ends.</li> </ul>			

## Helium Supply and Leak Detection Subsystem Mechanical Specification

### EDS Helium Supply and Leak Detection Subsystem Mechanical Specification (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
3.2	<ul style="list-style-type: none"> <li>Carbon-filled Teflon hose shall be fabricated in accordance with the referenced engineering drawings and specifications (refer to the EDS Phase 2 Series for Helium Supply and Leak Detection Subsystem Specifications number 3.1 for a list of drawings). Each hose shall have the drawing number stamped on the hose for identification.</li> <li>SS tubing shall be fabricated, installed, and tested in accordance with the referenced engineering drawings, EDS Phase 2 General Piping Specifications and applicable codes and standards.</li> </ul>			

Notes:

<sup>a</sup> Checklist based on Section 6030 Helium Supply and Leak Detection Subsystem Mechanical Specification dated 08/01/2006.

cfm = cubic feet per minute  
 EDS = Explosive Destruction System  
 Hz = hertz  
 L = liter  
 NPT = National Pipe Taper  
 PFA = perfluoro  
 psi = pounds per square inch  
 scfh = standard cubic feet per hour

## Miscellaneous Tools and Equipment Specification

### EDS Miscellaneous Tools and Equipment Specification

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
2.1.1	<ul style="list-style-type: none"> <li>The carbon-filled Teflon hose shall be Swagelok with 304 stainless steel (SS) overbraid, 303 SS sleeve, 316 SS collar, 316 SS end connections, and the hose inside diameter (ID) shall be as specified on the hose assembly drawings.</li> <li>The working pressure of the hose at 70°F is 2,000 psig for 13/32 inch ID hose, 1,500 psi for 5/8 inch ID hose, and 1,000 psi for 7/8-inch ID hose.</li> <li>Hose shall be pressure tested 30 to 60 seconds at 1.5 times the working pressure to a requirement of no leakage at ambient temperature.</li> </ul>			
2.1.2	<ul style="list-style-type: none"> <li>The stabilizing jack shall be a McMaster-Carr, part number 8817T14, 50 ton holding capacity ratchet action jack with removable handle and meets the following criteria: 25 ton lifting capacity; 34 1/2 inch minimum height; 11 1/2-inch maximum lift; 50 inch maximum height; 8 inch diameter saddle; 17 5/8 inches long x 16 inches wide base; 20 inches long handle; and 10-inch diameter x 2-inch wide wheels.</li> </ul>			
2.1.3	<ul style="list-style-type: none"> <li>The jack stand shall be a McMaster-Carr, part number 8059T13, 12 ton capacity stand with pin lock and meets the following criteria: 19-inch minimum height; 29 1/2-inch maximum height; 3-inch x 6-inch saddle; and 15 7/8-inch diameter base.</li> </ul>			

## Miscellaneous Tools and Equipment Specification

### EDS Miscellaneous Tools and Equipment Specification (Continued)

Spec. ¶s <sup>a</sup>	Item	Conform to Specifications	Comments	Initials
3.2	<ul style="list-style-type: none"><li>• Stainless steel tubing shall be fabricated, installed, and tested in accordance with the engineering drawings, EDS Phase 2 General Piping Specifications and applicable codes and standards.</li><li>• Tools and equipment shall be fabricated in accordance with engineering drawings, specifications, and all applicable codes and standards.</li><li>• Carbon filled Teflon hose shall be fabricated in accordance with engineering drawings and specifications. Each hose shall have the drawing number stamped on the hose for identification.</li></ul>			

Notes:

<sup>a</sup> Checklist based on Section 7000 Miscellaneous Tools and Equipment Specification dated 08/01/2006.

EDS = Explosive Destruction System

psi = pounds per square inch

## Drawing Requirements

### EDS Drawing Requirements

Drawing #	Item	Conform to Drawing	Comments	Initials
All applicable drawings	<ul style="list-style-type: none"> <li>Stamp part with drawing number</li> <li>Remove all sharp corners and burrs</li> <li>Unless otherwise specified maximum surface finish 63</li> <li>Tag part with drawing number</li> </ul>			
A67259-P2	<ul style="list-style-type: none"> <li>Finish: Coat with Xylem 1070 DF 524 Medium dark blue</li> </ul>			
A67266-P2	<ul style="list-style-type: none"> <li>Dowel Pin (item 10) to be press fit into clamp hanger (item 1). 2 places as shown on drawing</li> </ul>			
A67279-P2	<ul style="list-style-type: none"> <li>Radii must make a smooth transition to mating surfaces. Surface finish to be maintained throughout</li> </ul>			
A68157	<ul style="list-style-type: none"> <li>All welds to be continuous. Full penetration, and ground smooth</li> </ul>			
A68217-P2	<ul style="list-style-type: none"> <li>Apply Teflon® tape to all NPT threads</li> <li>Torque identified items to 90 FT LBS</li> <li>Torque identified items to 30 FT LBS</li> </ul>			
A68229	<ul style="list-style-type: none"> <li>All welds to be full penetration, ground and polished to avoid trapping of liquids</li> </ul>			
A68584-P2	<ul style="list-style-type: none"> <li>To be free of features that can allow trapping of liquids all welds connecting with adjacent surfaces must have smooth transitions and be continuous</li> <li>Unless otherwise specified: mil standard finish acceptable</li> </ul>			

## Drawing Requirements

### EDS Drawing Requirements (Continued)

Drawing # <sup>a</sup>	Item	Conform to Drawing	Comments	Initials
A68587-P2	<ul style="list-style-type: none"> <li>Apply Teflon<sup>®</sup> tape to all pipe threads</li> </ul>			
A68588-P2	<ul style="list-style-type: none"> <li>Apply Teflon<sup>®</sup> tape to all pipe threads</li> </ul>			
A68592-P2	<ul style="list-style-type: none"> <li>Assemble all pipe threads using Teflon<sup>®</sup> tape</li> </ul>			
A68593-P2	<ul style="list-style-type: none"> <li>Assemble all pipe threads using Teflon<sup>®</sup> tape</li> </ul>			
A68597-P2	<ul style="list-style-type: none"> <li>All pipe thread joints to be assembled with Teflon<sup>®</sup> tape</li> </ul>			
A68598-P2	<ul style="list-style-type: none"> <li>All pipe thread joints to be assembled with Teflon<sup>®</sup> tape</li> </ul>			
A68999-P2	<ul style="list-style-type: none"> <li>Remove existing nut and ferrule from male connector (item 8) and replace with plug (item 10)</li> <li>Apply Teflon<sup>®</sup> tape to all pipe threads</li> </ul>			
A69006-P2	<ul style="list-style-type: none"> <li>All structures to be free of features that can allow trapping of liquids. All welds connecting with adjacent surfaces must have smooth transition and be continuous</li> <li>Weld following standard practices outlined in ANS/AWS 10.4</li> </ul>			
A69007-P2	<ul style="list-style-type: none"> <li>Make sure that panel is installed before screwing valve handles on</li> </ul>			
A69015-P2	<ul style="list-style-type: none"> <li>All pipe thread joints to be assembled using Teflon<sup>®</sup> tape</li> </ul>			



## Drawing Requirements

### EDS Drawing Requirements (Continued)

Drawing # <sup>a</sup>	Item	Conform to Drawing	Comments	Initials
A69041-P2	<ul style="list-style-type: none"> <li>All structures to be free of features that can allow trapping of liquids. All welds connecting with adjacent surfaces must have smooth transition and be continuous</li> <li>Weld following standard practices outlined in ANS/AWS 10.4</li> </ul>			
A69042-P2	<ul style="list-style-type: none"> <li>All structures to be free of features that can allow trapping of liquids. All welds connecting with adjacent surfaces must have smooth transition and be continuous</li> <li>Weld following standard practices outlined in ANS/AWS 10.4</li> </ul>			
A69043-P2	<ul style="list-style-type: none"> <li>All pipe thread joints to be assembled using Teflon<sup>®</sup> tape</li> </ul>			
A69050-P2	<ul style="list-style-type: none"> <li>All corner seams to be continuously welded and ground smooth to prevent liquid contamination</li> </ul>			
A69058-P2	<ul style="list-style-type: none"> <li>Apply Teflon<sup>®</sup> tape to all pipe threads</li> </ul>			
	<b>Volume 2 of 3</b>			
A69231-P2	<ul style="list-style-type: none"> <li>Method of fabrication option of manufacturer. If welded, all corner seams to be continuously welded and ground smooth to prevent liquid contamination</li> </ul>			
A69232-P2	<ul style="list-style-type: none"> <li>Method of fabrication option of manufacturer. If welded, all corner seams to be continuously welded and ground smooth to prevent liquid contamination</li> </ul>			

## Drawing Requirements

### EDS Drawing Requirements (Continued)

Drawing # <sup>a</sup>	Item	Conform to Drawing	Comments	Initials
A69293-P2	<ul style="list-style-type: none"> <li>All text to be positioned vertically as shown and centered around the center of its respective cutout. The panel title (process control) to be centered on the panel and positioned vertically</li> </ul>			
A69399-P2	<ul style="list-style-type: none"> <li>Assemble all pipe threads using Teflon<sup>®</sup> tape</li> </ul>			
A69400-P2	<ul style="list-style-type: none"> <li>All welds to be continuous, ground and polished to prevent entrapment of liquids</li> </ul>			
A69428-P2	<ul style="list-style-type: none"> <li>All welds to be continuous, ground and polished to prevent entrapment of liquids</li> </ul>			
A69432-P2	<ul style="list-style-type: none"> <li>All welds to be full penetrations, continuous, ground, and polished to avoid trapping liquids</li> </ul>			
A69448-P2	<ul style="list-style-type: none"> <li>Apply Teflon<sup>®</sup> tape to all pipe threads</li> <li>Apply thermo adhesive (item 23) between tank (item 10) and heaters (items 18) before installing. Apply washer, heat strap, and one hex nut then tighten down. The first set of heater straps are to be installed running from bolts on each side of the heater box to the other side of the heater. Install heater insulation before installing bottom shrouds, then install two more heater straps as done above and two hex bolts to each stud then tighten them down</li> </ul>			

## Drawing Requirements

### EDS Drawing Requirements (Continued)

Drawing # <sup>a</sup>	Item	Conform to Drawing	Comments	Initials
A69486-P2	<ul style="list-style-type: none"> <li>Connect RF Converter box assembly (item 13) using wiring diagram drawing number A69786-P2</li> <li>Connect vessel thermocouple (TC 3) cable assembly (item 8) connect vessel pressure transducer (PT 1) cable assembly (item 22) to connector (item 6)</li> </ul>			
A69487-P2	<ul style="list-style-type: none"> <li>All welds to be continuous and liquid tight</li> </ul>			
A69490-P2	<ul style="list-style-type: none"> <li>All welds to be full penetration, ground, and polished to avoid trapping of liquids</li> </ul>			
A69504-P2	<ul style="list-style-type: none"> <li>All welds to be continuous and liquid tight. Weld following standard practices outlined in ANSI/AWS 10.4</li> <li>Install item 10 using Teflon<sup>®</sup> tape</li> <li>Install item 2 with Teflon<sup>®</sup> seal facing away from assembly</li> </ul>			
A69505-P2	<ul style="list-style-type: none"> <li>All welds to be continuous, ground and polished to prevent entrapment of liquids</li> </ul>			
A69506-P2	<ul style="list-style-type: none"> <li>Permanently attach studs (item 5) to tank shroud (item 2). Method to be determined by vendor, studs (item) must not penetrate outer surface of shroud (item 2) in order to prevent leakage.</li> </ul>			
A69507-P2	<ul style="list-style-type: none"> <li>All welds to be full penetration, ground and polished to avoid trapping of liquids</li> </ul>			

## Drawing Requirements

### EDS Drawing Requirements (Continued)

Drawing # <sup>a</sup>	Item	Conform to Drawing	Comments	Initials
A69514-P2	<p>Hydraulic tensioned pump wiring modification instructions:</p> <ul style="list-style-type: none"> <li>• Inspect electrical J-box for following – <ul style="list-style-type: none"> <li>- (five) 5-point terminal strip with pressure switch wiring attached</li> <li>- In-line fuse, 15 AMP. (in coming power)</li> <li>- (two) 2-pressure switches marked HIGH and LOW</li> </ul> </li> <li>• Remove blue wiring from terminal strip (wires from HIGH and LOW pressure switches). Wire-nut and attach to (m) relay, terminal point (1) with a female disconnect terminal</li> <li>• If necessary relocate rectifier to center of J-box at top. There is one mounting hole available</li> <li>• Punch knock-out at top right-hand side of J-box and install Thomas &amp; Betts (25230 Cord-Grip connector.)</li> <li>• Install 90 Deg. 6-pin connector and cord (Daniel woodhead, p/n 42602-90ss) to new cord grip. Strip back 8" to 10" of outer insulation to expose colored conductors, and tighten down</li> <li>• Use the wiring diagram to attach remaining wiring. Use insulated ring tongue terminals to attach wires to terminal board</li> <li>• Test hydraulic systems pressure – <ul style="list-style-type: none"> <li>- Set high limit to 6200 PSI</li> <li>- Set low limit to 5300 PSI</li> </ul> </li> </ul>			

## Drawing Requirements

### EDS Drawing Requirements (Continued)

Drawing # <sup>a</sup>	Item	Conform to Drawing	Comments	Initials
A69521-P2	<ul style="list-style-type: none"> <li>Welds to be continuous and liquid tight</li> </ul>			
A69791-P2	<ul style="list-style-type: none"> <li>Check installation of vessel control panel to trailer goose neck floor and installation parts list with drawing 24502-P2, power panel frame installation</li> </ul>			
A69795-P2	<ul style="list-style-type: none"> <li>Check installation of vessel control panel to trailer goose neck floor and installation parts list with drawing 24502-P2, power panel frame installation</li> </ul>			
A69797-P2	<ul style="list-style-type: none"> <li>Labels shown on this drawing to be 1/4 (.250) high black characters and located approximately where shown</li> <li>Alternate LED part #18626131 (red): EBT OPTICAL</li> <li>Alternate LED part #MLB-5RD 1203 (green): MICROLAMP</li> <li>Alternate LED part #MLB-5YL1203 (yellow): MICROLAMP</li> </ul>			
A69798-P2	<ul style="list-style-type: none"> <li>Apply tie-wraps (item) to wire bundles as needed</li> <li>Hardwire per system diagrams A68235-P2, A68236-P2, A69482-P2, A69860-P2, A70148-P2</li> <li>Check installation of vessel control panel to trailer goose neck floor and installation parts list with drawing 24502-P2, power panel frame installation</li> </ul>			

## Drawing Requirements

### EDS Drawing Requirements (Continued)

Drawing # <sup>a</sup>	Item	Conform to Drawing	Comments	Initials
A69799-P2	<ul style="list-style-type: none"> <li>Check installation of vessel control panel to trailer goose neck floor and installation parts list with drawing 24502-P2, power panel frame installation</li> </ul>			
A69800-P2	<ul style="list-style-type: none"> <li>Match drill holes for 10-32-UNF threads at assembly in approximate location</li> <li>Labels shown on sheet 2 to be 1/4 (.250) high black characters and located approximately where shown</li> <li>Match drill holes for 8-32-UNF threads at assembly in approximate location</li> </ul>			
A69801-P2	<ul style="list-style-type: none"> <li>Apply tie-wraps (item 32) to wire bundles as required</li> <li>Check hardwire per system diagrams</li> <li>Install and punch hole for battery indicator (item 6) per manufacturer instructions</li> <li>For installation of heater power panel to goose neck floor and installation parts , see drawing A69801-P2 sheet 2</li> </ul>			
A69803-P2	<ul style="list-style-type: none"> <li>Match drill holes for 10-32-UNF threads at assembly in approximate location</li> <li>Labels shown on sheet 2 to be 1/4 (.250) high black characters and located approximately where shown</li> </ul>			
A69804-P2	<ul style="list-style-type: none"> <li>All text should be positioned as shown in drawing</li> <li>Small text, Large text, and outlets should be shown</li> </ul>			

## Drawing Requirements

### EDS Drawing Requirements (Continued)

Drawing # <sup>a</sup>	Item	Conform to Drawing	Comments	Initials
A69809-P2	<ul style="list-style-type: none"> <li>If welded, all welds to be full penetration, continuous, ground and polished to avoid trapping of liquid</li> </ul>			
A69820-P2	<ul style="list-style-type: none"> <li>All text should be positioned as shown in drawing</li> <li>Small text, large text, and outlets should be shown</li> </ul>			
A69821-P2	<ul style="list-style-type: none"> <li>All text should be positioned as shown in drawing</li> <li>Small text, large text, and outlets should be shown</li> </ul>			
A69824-P2	<ul style="list-style-type: none"> <li>All text should be positioned as shown in drawing</li> </ul>			
A69825-P2	<ul style="list-style-type: none"> <li>All text should be positioned as shown in drawing</li> </ul>			
A69841-P2	<ul style="list-style-type: none"> <li>Disassemble relief valve (item 5) to insert spring (item 8) and set the relief valve (item 5) to 1.000 psi.</li> </ul>			
A69847-P2	<ul style="list-style-type: none"> <li>Assemble all NPT threads with Teflon<sup>®</sup> tape except as noted on drawing</li> </ul>			
A69852-P2	<ul style="list-style-type: none"> <li>Apply Teflon<sup>®</sup> tape to all pipe threads</li> </ul>			
A69854-P2	<ul style="list-style-type: none"> <li>Text is positioned vertical</li> </ul>			
A69864-P2	<ul style="list-style-type: none"> <li>Apple cable tie mounts (item 16) and tie-wraps (item 17) as needed</li> </ul>			

## Drawing Requirements

### EDS Drawing Requirements (Continued)

Drawing # <sup>a</sup>	Item	Conform to Drawing	Comments	Initials
A69870-P2	<ul style="list-style-type: none"> <li>Radii must make a smooth transition to mating surfaces</li> <li>Surface finish must be maintained throughout</li> </ul>			
A69871-P2	<ul style="list-style-type: none"> <li>Radii must make a smooth transition to mating surfaces</li> <li>Surface finish must be maintained throughout</li> </ul>			
A69982-P2	<ul style="list-style-type: none"> <li>All welds continuous ground and polish to prevent entrapment of liquid</li> </ul>			
A69987-P2	<ul style="list-style-type: none"> <li>Apply change lever and lever kit to hardware</li> </ul>			
A69996-P2	<ul style="list-style-type: none"> <li>All welds to be full penetration, continuous, and ground smooth to avoid trapping of liquid</li> </ul>			
A70035-P2	<ul style="list-style-type: none"> <li>All welds to be full penetration, continuous, and ground smooth to avoid trapping of liquid</li> </ul>			
A70038	<ul style="list-style-type: none"> <li>All welds to be full penetration, continuous, and ground smooth to avoid trapping of liquid</li> </ul>			
	<b>Volume 3 of 4</b>			
A70043-P2	<ul style="list-style-type: none"> <li>All welds to be continuous, ground and polished to prevent entrapment of liquids</li> </ul>			



## Drawing Requirements

### EDS Drawing Requirements (Continued)

Drawing # <sup>a</sup>	Item	Conform to Drawing	Comments	Initials
A70046	<ul style="list-style-type: none"> <li>Make certain that trailer has railings, stairs, fold-out reagent platform, hydraulics for leveling legs and reagent supply platform, secondary containment for process area and reagent supply platform, custom electrical conduit runs, and pneumatic distribution piping</li> </ul>			
A70049	<ul style="list-style-type: none"> <li>All welds to be continuous, ground and polished to prevent entrapment of liquids</li> </ul>			
A70050-P2	<ul style="list-style-type: none"> <li>Apply Teflon<sup>®</sup> tape to all pipe treads</li> </ul>			
A70054-P2	<ul style="list-style-type: none"> <li>All welds to be continuous, ground and polished to prevent entrapment of liquids</li> </ul>			
A70060-P2	<ul style="list-style-type: none"> <li>If welded all welds to be continuous, ground and polished to prevent entrapment of liquids</li> </ul>			
A70063-P2	<ul style="list-style-type: none"> <li>Apply Teflon<sup>®</sup> tape to all NPT threads before installing</li> </ul>			
A70069-P2	<ul style="list-style-type: none"> <li>All welds to be continuous, ground and polished to prevent entrapment of liquids</li> </ul>			
A70072-P2	<ul style="list-style-type: none"> <li>Remove nuts and bolt from pump outlet manifold. Flip outlet manifold so it faces the same direction as inlet manifold</li> </ul>			
A70101	<ul style="list-style-type: none"> <li>All welds to be continuous, ground and polished to prevent entrapment of liquids</li> </ul>			

## Drawing Requirements

### EDS Drawing Requirements (Continued)

Drawing # <sup>a</sup>	Item	Conform to Drawing	Comments	Initials
A70106-P2	<ul style="list-style-type: none"> <li>Make note that the labels are placed in the correct place and 1/4 inch tall in black lettering</li> </ul>			
A70107-P2	<ul style="list-style-type: none"> <li>Make note that the labels are placed in the correct place and 1/4 inch tall in black lettering</li> </ul>			
A70108-P2	<ul style="list-style-type: none"> <li>Make note that the labels are placed in the correct place and 1/4 inch tall in black lettering</li> </ul>			
A70109-P2	<ul style="list-style-type: none"> <li>Make note that the labels are placed in the correct place and 1/4 inch tall in black lettering</li> </ul>			
A70131-P2	<ul style="list-style-type: none"> <li>Apply Teflon<sup>®</sup> tape to all pipe threads</li> </ul>			
A70156	<ul style="list-style-type: none"> <li>All welds to be continuous, full penetration, and ground smooth</li> </ul>			
A70169	<ul style="list-style-type: none"> <li>Welds to be full penetration, continuous, and ground smooth to prevent entrapment of liquids</li> </ul>			
A70171-P2	<ul style="list-style-type: none"> <li>Wrap all threads with Teflon<sup>®</sup> tape</li> </ul>			
A70172-P2	<ul style="list-style-type: none"> <li>Wrap all threads with Teflon<sup>®</sup> tape</li> </ul>			
A70173-P2	<ul style="list-style-type: none"> <li>Wrap all threads with Teflon<sup>®</sup> tape</li> </ul>			
A70178	<ul style="list-style-type: none"> <li>All welds to be continuous, full penetration, and ground smooth</li> </ul>			

## Drawing Requirements

### EDS Drawing Requirements (Continued)

Drawing # <sup>a</sup>	Item	Conform to Drawing	Comments	Initials
A70179-P2	<ul style="list-style-type: none"> <li>All text to be Arial 36 point black lettering on white background</li> <li>All lines and outlines to be 4 point black</li> </ul>			
A70735	<ul style="list-style-type: none"> <li>Apply tie-wraps to wire bundles as needed</li> <li>For installation of utility panel to trailer goose neck floor see sheet 2</li> </ul>			
A70736	<ul style="list-style-type: none"> <li>All text to be positioned vertically as shown and centered around the center of its respective cutout. The panel title is to be centered on the panel and positioned vertically as shown on drawing</li> </ul>			
A70743	<ul style="list-style-type: none"> <li>Apply double sided adhesive tape to underside of wire duct before installing onto panel door</li> <li>Labels shown on this drawing to be 1/4 high black characters and located approximately where shown in drawing</li> </ul>			
A70744	<ul style="list-style-type: none"> <li>All text to be positioned vertically as shown and centered around the center of its respective cutout. The panel title is to be centered on the panel and positioned vertically as shown on drawing</li> </ul>			
A70774	<ul style="list-style-type: none"> <li>Apply tie-wrap and cable tie mounts as required</li> </ul>			
A71035	<ul style="list-style-type: none"> <li>Fabrication is optional. If welded, all welds must be continuous and ground smooth to prevent entrapment of liquids</li> </ul>			

## Drawing Requirements

### EDS Drawing Requirements (Continued)

Drawing # <sup>a</sup>	Item	Conform to Drawing	Comments	Initials
A71052	<ul style="list-style-type: none"> <li>Apply pipe tape to all pipe threads</li> </ul>			
A71054	<ul style="list-style-type: none"> <li>Apply pipe tape to all pipe threads</li> </ul>			
A71073	<ul style="list-style-type: none"> <li>Coat parts indicated with Xylan 1070 DF 524 medium dark blue, mask all holes to prevent coating of inside diameter</li> </ul>			
A71085	<ul style="list-style-type: none"> <li>All welds to be continuous, ground, and polished to prevent entrapment of liquids</li> </ul>			
A71091-P2	<ul style="list-style-type: none"> <li>Three terminal blocks removed to show din rail and mounting hardware</li> <li>Labels shown on this drawing to be black characters and located approximately where shown</li> <li>Match drill holes and tap holes</li> </ul>			
A71092-P2	<ul style="list-style-type: none"> <li>Labels shown on this drawing to be black characters and located approximately where shown</li> <li>Match drill holes and tap holes</li> </ul>			
A71110	<ul style="list-style-type: none"> <li>All welds to be full penetration, ground and polished to avoid trapping of liquids</li> </ul>			
A71116	<ul style="list-style-type: none"> <li>All welds to be full penetration, ground and polished to avoid trapping of liquids</li> </ul>			
A71133	<ul style="list-style-type: none"> <li>Apply tape sticky side down to under side of cover</li> </ul>			

## Drawing Requirements

### EDS Drawing Requirements (Continued)

Drawing # <sup>a</sup>	Item	Conform to Drawing	Comments	Initials
	<b>Volume 4 of 4</b>			
A71134	<ul style="list-style-type: none"> <li>Method of fabrication to be determined by manufacturer if welded all welds to be continuous, ground, and polished to prevent entrapment of liquid</li> <li>Permanently attach studs to heater shroud method to be determined by manufacturer studs must not penetrate outer surface of shroud in order to prevent leakage</li> <li>Install weld pem nut per manufacturer instruction</li> </ul>			
A71135	<ul style="list-style-type: none"> <li>Method of fabrication to be determined by manufacturer if welded all welds to be continuous, ground, and polished to prevent entrapment of liquid</li> <li>Permanently attach studs to heater shroud method to be determined by manufacturer studs must not penetrate outer surface of shroud in order to prevent leakage</li> <li>Weld clip part of 11605A14 from drawing A71134 to shroud in location shown. Before permanently welding clip adjust clip so to have room for adjustment</li> </ul>			
A71137	<ul style="list-style-type: none"> <li>Apply 3-layers of E-glass by starting at the end and going to the dimension shown. Push E-glass down after each layer, after last layer is applied attach retaining clips to pins to hold E-glass in place</li> </ul>			

## Drawing Requirements

### EDS Drawing Requirements (Continued)

Drawing # <sup>a</sup>	Item	Conform to Drawing	Comments	Initials
A71142	<ul style="list-style-type: none"> <li>Apply 3-layers of E-glass by starting at the end and going to the dimension shown. Push E-glass down after each layer, after last layer is applied attach retaining clips to pins to hold E-glass in place</li> </ul>			
A71148	<ul style="list-style-type: none"> <li>All welds to be continuous, ground and polished to avoid trapping of liquids</li> </ul>			
A71679	<ul style="list-style-type: none"> <li>All welds to be full penetration, ground and polished to avoid trapping of liquids</li> </ul>			
A71681	<ul style="list-style-type: none"> <li>All welds to be full penetration, ground and polished to avoid trapping of liquids</li> </ul>			
A71682	<ul style="list-style-type: none"> <li>All welds to be full penetration, ground and polished to avoid trapping of liquids</li> </ul>			
A71694	<ul style="list-style-type: none"> <li>Method of fabrication is vendor's option. If welded all welds to be full penetration. Ground and polished to avoid trapping of liquids</li> </ul>			
A71695	<ul style="list-style-type: none"> <li>Method of fabrication is vendor's option. If welded all welds to be full penetration. Ground and polished to avoid trapping of liquids</li> </ul>			
A71730	<ul style="list-style-type: none"> <li>Install tarp on trailer</li> </ul>			

## Drawing Requirements

### EDS Drawing Requirements (Continued)

Drawing # <sup>a</sup>	Item	Conform to Drawing	Comments	Initials
A71960	<ul style="list-style-type: none"> <li>• Apply tie-wrap to wire bundles as needed</li> <li>• See drawing A71960 sheet 2 for panel installation to trailer</li> <li>• Match drill using dimensions and holes on part, tap for 10-32 UNF</li> <li>• Locate labels approximately where shown, text to be 1/4 (.250) high black letters</li> </ul>			
A71962	<ul style="list-style-type: none"> <li>• Labels shown on this drawing to be black characters and located approximately where shown</li> <li>• Apply adhesive tape to wire duct before applying wire duct to back of door in approximate location shown</li> </ul>			
A71977	<ul style="list-style-type: none"> <li>• Labels shown on this drawing to be 1/4 high black characters and located approximately where shown in drawing</li> </ul>			
A72019	<ul style="list-style-type: none"> <li>• Label switch button as shown in drawing</li> </ul>			
A72020	<ul style="list-style-type: none"> <li>• Label switch button as shown in drawing</li> </ul>			
A72533	<ul style="list-style-type: none"> <li>• Roll to diameter specified and butt weld ends</li> </ul>			
A72546	<ul style="list-style-type: none"> <li>• All welds to be continuous, full penetration, and ground smooth</li> </ul>			
A72591	<ul style="list-style-type: none"> <li>• All welds to be continuous, ground and polished to prevent entrapment of liquids</li> </ul>			

## Drawing Requirements

### EDS Drawing Requirements (Continued)

Drawing # <sup>a</sup>	Item	Conform to Drawing	Comments	Initials
A72614	<ul style="list-style-type: none"> <li>All text to positioned vertically as shown and centered above the center of its respective cut out</li> </ul>			
A72616	<ul style="list-style-type: none"> <li>Labels shown on this drawing to be 1/4 high black characters and located approximately where shown in drawing</li> </ul>			
A72639-P2	<ul style="list-style-type: none"> <li>Make sure CGB is removed and discarded prior to attachment of 1/2" Swagelok-1/2" NPT compression fitting to transducer</li> </ul>			
A72649-P2	<ul style="list-style-type: none"> <li>Use appropriate crimp tool for assembly</li> <li>Reference labeling is for the connection fabrication only</li> <li>Item 5 shall be attached inside the temperature sensor housing assembly located on trailer vessel assembly DWG. No. A67256</li> </ul>			

Notes:

<sup>a</sup> Extracts of drawing notes provided for checklist.

EPDM = ethylene propylene diene monomer  
 NPT = National Pipe Taper  
 psi = pounds per square



**APPENDIX C**  
**SYSTEMIZATION AREAS OF TEST AND INSPECTION**

## **APPENDIX C**

### **SYSTEMIZATION AREAS OF TEST AND INSPECTION**

The following required areas of test and inspection are provided for incorporation into the contractor developed systemization test plan. The contractor is responsible for testing/inspection of government-furnished equipment (GFE) listed in this appendix. The government is responsible for ensuring that GFE meet specifications and repair, if required.

#### *General Test and Inspections:*

- Visual inspections for damage, loose bolts (for example, flanges, valve packings, structure, and panels), loose wiring connections, and wiring insulation damage
- Electrical wiring continuity checks and circuit breaker trip setting verification
- Piping and hydraulic system flush and sampling to verify removal of weld slag and construction debris
- Piping system hydrostatic testing to verify system integrity including welds, valve packings, flanged joints, instrument tubing connections, and hose connectors
- Trailer and platform containment pan leak tests to verify integrity
- Pipe Y-type strainers are clean and have proper size screens installed
- Manual valves operate smoothly throughout the full range of motion without binding and shutoff tightly.

*Trailer Subsystem:*

- Hydraulic leveling system checkout with fully loaded trailer
- Platform hydraulic systems
- Chassis and suspension
- Structure and decking
- Railings and stairs
- Lighting system, including brake lights, turn signals, flashers, taillights, etc.
- Electrical receptacles.

*Reagent and Water Supply Subsystems:*

- Water source pump (P-301), water supply pump (P-302), reagent supply P-303), and reagent source pump (P-304) meet design flow and pressure specifications in all modes of operation, including filling the water and reagent tanks, filling the containment vessel, supplying the water and reagent tank and trailer secondary containment pan spray nozzles, and supplying the waste drums
- Air compressor meets design flow and pressure specifications required for operation
- Air supply regulators PRV-701 and PRV-702 meet design specifications for controlling pressures at the air driven pumps

- Reagent and water tank spray nozzles and trailer secondary containment pan spray nozzle meet design specifications
- Reagent and water tank heaters meet design specifications, including capability to heat tank contents to required temperatures in the required amount of time
- Reagent and water tank heater ON, OFF, and RESET buttons and associated status indicating lights operate per design specifications to control and provide heater status
- Reagent and water tank temperature sensors, setpoint controllers, and switches maintain the tank temperatures at the specified setpoint
- Reagent and water tank temperature sensors and temperature limit controllers initiate a high temperature warning light alarm and general annunciator alarm at the required tank temperature
- Reagent and water tank magnetic float level gauges provide correct indication of level
- Reagent and water tank high and low level switches initiate warning light alarms at the required tank levels
- Reagent and water tank low level switches initiate general annunciator alarms at the required tank levels
- Reagent and water tank heater temperature controller and level switch control logic operates per design specifications to protect the tanks and heaters

- Emergency stop buttons isolate supply air to the air driven pumps, isolate the supply line to waste drum D-401, and de-energize the reagent and water tank heaters and reagent/water supply drum D-404 heater
- Supply hose stowed position indicating light and interlock with containment vessel rotation control operates per design specifications
- Reagent/water supply drum D-404 weight scale provides accurate weight
- Reagent/water supply drum D-404 electric supply pump and electric source pump meet design flow and pressure specifications in all modes of operation, including filling the water and reagent tanks, filling the containment vessel, supplying the water and reagent tank and trailer secondary containment pan spray nozzles, and supplying the waste drums.

*Process and Pan Waste Subsystem:*

- Rupture disc on waste tanks D-401 and D-401A operate per design specifications to initiate a ruptured disc warning light alarm and isolate the supply line to waste drum D-401
- Rupture disc on waste tanks D-401 and D-401A operate per design specifications to initiate a ruptured disc general annunciator alarm
- Motor-operated supply line isolation valve 27 opens and closes in the required amount of time and the ON and OFF position indicating lights operate per design
- Waste tanks D-401, D-401A, and D-403 weight scales provide accurate weights

- Carbon filter on waste drum D-402 meets design specifications
- Pan pump (P-305) meets design flow and pressure specifications
- Pan pump hose strainer is clean and has proper size screen installed
- Vessel effluent hose stowed position indicating light and interlock with containment vessel rotation control operates per design specifications.

*Helium Supply and Vacuum Subsystem:*

- Helium supply regulators PRV-600 and PRV-602 meet design specifications for controlling helium pressures for purging the containment vessel and testing the door seal
- Vacuum pump P-308 meets design flow and pressure specifications
- Vacuum pump P-308 ON and OFF buttons and associated indicating lights operate per design specifications to control and provide pump status
- Emergency stop buttons de-energize the vacuum pump
- Vacuum pump and leak detector hoses stowed position indicating lights and interlock with containment vessel rotation control operates per design specifications
- Helium leak detector pump P-307 operates per design specifications.

*Containment Vessel Subsystem:*

- Containment vessel heater meets design specifications, including capability to heat vessel contents to required temperatures in the required amount of time
- Containment vessel heater ON, OFF, and RESET buttons and associated status indicating lights operate per design specifications to control and provide heater status
- Containment vessel temperature sensors, setpoint controllers, and switches maintain the vessel temperatures at the specified setpoint
- Containment vessel temperature sensors and temperature limit controllers initiate a high temperature warning light alarm at the required tank temperature
- Containment vessel heater temperature control AUTO–MANUAL switch operates per design specifications to allow heater interlocks to be overridden in the manual mode
- Containment vessel heater temperature controller and rotation controller control logic operate per design specifications to protect the vessel and heater
- Containment vessel rotation ON and OFF buttons and associated status indicating lights operate per design specifications to control and provide vessel control status
- Containment vessel rotation AUTO-OFF-MANUAL switch and associated status indicating lights operate per design specifications to provide auto drive control and manual drive control and provide system status

- Containment vessel control FILL, HALT, HOME, ROTATE, and DRAIN buttons and associated status indicating lights operate per design specifications to control and provide vessel control status
- Containment vessel control ROTATION INTERLOCK BYPASS-ON switch and associated status indicating lights operate per design specifications to allow hose and clamp position interlocks to be overridden in the manual mode to control and provide vessel control status
- Containment vessel pendant operates per design specifications to allow manual vessel control including clockwise and counter-clockwise jogging, clockwise and counter-clockwise rotation, and stopping
- Containment vessel control DRIVE FAULT/RESET button and associated status indicating light operate per design specifications for drive fault indication and reset after fault correction
- Radio frequency transmitter and receiver operate per design specifications to allow correct vessel pressure and temperature data to be transmitted to remote pressure readout stations and temperature and vessel controllers while the vessel is rotating
- Radio frequency fault and signal status indicating lights operate per design specifications to provide radio frequency system status
- Emergency stop buttons de-energize the containment vessel rotation motor and the vessel heater
- Containment vessel motor operates per design specifications to position the vessel, as required.



*Clamp Hanger and Hydraulic Nut Subsystem:*

- Hydraulic tensioner pump P-306 operates per design specification
- Hydraulic tensioner pump ON and OFF buttons and associated status indicating lights operate per design specifications to control and provide pump status
- Hydraulic tensioner pump pendant functions per design specifications
- Hydraulic tensioner pump ADVANCE and RETRACT buttons operate per design specifications to control pump
- Hydraulic tensioner pump LOW-HIGH switch operates per design specifications to control nut torque
- Hydraulic tensioner pump hose stowed position indicating light and interlock with containment vessel rotation control operates per design specifications
- Clamp hanger IN and OUT buttons and associated status indicating lights operate per design specifications to control and provide clamp hanger status when operating in the local mode
- Clamp hanger IN and OUT buttons operate per design specifications to control the clamp hanger when operating in the pendant mode
- Clamp hanger LOCAL-OFF-PENDANT key operated switch operates per design specifications to allow the clamp motor controller to be operated locally or remotely from the pendant

- Clamp hanger FAST-SLOW key operated switch operates per design specifications to control the clamp motor speed
- Clamp hanger motor operates per design specifications to position the clamp hangers as required
- Clamp hanger stowed position indicating light operates per design specifications to provide clamp hanger status
- Clamp hanger stowed and interlock with vessel heater control is per design specifications
- Clamp hangers closed position indicating light operates per design specifications to provide clamp hanger status
- Clamp hangers closed and interlock with tensioner pump control is per design specifications.

*Electrical Systems:*

- 480 VAC and 208 VAC power diagnostics status indicating lights operate per design specifications to provide incoming power status
- Panel test lamp pushbutton operates per design specifications to energize all indicating lights
- Power conditioner PC1 and PC2 status indicating lights operate per design specifications to provide power conditioner status.

*Instrument Calibrations:*

- The following instruments are calibrated per national standards and have been labeled with a calibration sticker showing the calibration date:
  - TE-100 (vessel temperature)
  - PT-101 (vessel pressure)
  - IRTE-106 (vessel surface temperature)
  - HPS-111 (tensioner pump HI discharge pressure switch)
  - LPS-111 (tensioner pump LO discharge pressure switch)
  - VG-119 (vacuum pump pressure)
  - PG-110 (nut pump discharge pressure gauge)
  - PT-112 (nut pump pressure transmitter)
  - TE-200A (water tank temperature)
  - TE-200B (water tank temperature)
  - TLC-200 (water tank temperature limits controller)
  - TSC-201 (water tank temperature setpoint controller)
  - LVLSW- 202 (water tank lo level switch)
  - LVHSW-202 (water tank hi level switch)

- TE-300A (reagent tank temperature)
- TE-300B (reagent tank temperature)
- TLC-300 (reagent tank temperature limits controller)
- TSC-301 (reagent tank temperature setpoint controller)
- LVLSW-302 (reagent tank lo level switch)
- LVHSW-302 (reagent tank hi level switch)
- PT-400 (water/reagent supply pump pressure).

*Pressure Relief Valve Calibrations:*

- The following relief valves are calibrated per national standards and have been labeled with a calibration sticker showing the calibration date and pressure relief setting:
  - Electric supply pump relief valve
  - Helium supply system (PSV-601)
  - Air supply (PSV-700).

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**APPENDIX D**  
**INSTRUCTION TO CONTRACTOR FOR CONDUCTING LIMITED**  
**FUNCTIONAL TEST**

# APPENDIX D

## INSTRUCTION TO CONTRACTOR FOR CONDUCTING LIMITED FUNCTIONAL TEST

<b>References</b> EDS Phase 2 Series SOP	Limited Functional Test Procedures
<u>Procedure 2</u> Checklist for EDS Setup Procedures	<b>Task:</b> Perform EDS Setup Preventive Maintenance Checks and Services for EDS Trailer IAW EDS Phase 2 Series SOP utilizing Table 2-1.
<u>Procedure 2</u> Checklist for EDS Setup Procedures	<b>Task:</b> Perform EDS Pre-Operations Checks IAW EDS Phase 2 Series SOP utilizing Table 2-2, Items 5 thru 10, 12 thru 18, 19 (bullets 1 & 2), 20 thru 21, and 25 thru 27.
<u>Procedure 3</u> Prepare Chemical Reagents (water)	<p><b>Conditions:</b> Fill tank 1 with 200 liters of water by use of water source pump per Procedure 3, Steps 1.0 thru 1.4.1.2. Verify Tank 1 Level LOW light is illuminated for volumes less than 30 liters and is NOT illuminated for volumes greater than 30 liters. Fill remainder of tank with 50 liters of water (through bottom of tank) by use of alternate procedure per Procedure 3, Steps 4.0 thru 4.4. Verify Tank 1 Level HIGH light is illuminated for volumes greater than 245 liters.</p> <p>Fill tank 2 with 150 liters of water by use of water source pump per Procedure 3, Steps 1.0 thru 1.4.1.2. Verify Tank 2 Level LOW light is illuminated for volumes less than 30 liters and is NOT illuminated for volumes greater than 30 liters. Fill tank 2 with an additional 50 liters of water by use of reagent source pump per Procedure 3, Steps 1.5 thru 1.6. Fill remainder of tank with 50 liters of water (through bottom of tank) by use of alternate procedure (Drum Pump) in Steps 5.0 thru 5.7. Verify Tank 2 Level HIGH light is illuminated for volumes greater than 245 liters. <b>Note: Ensure liquid supply drum is filled with water when performing the test.</b></p> <p>Heat water in supply tanks to 60 ±5°C per Procedure 3, Steps 2.0 thru 3.2.</p>
<u>Procedure 9</u> Closing and Sealing Containment Vessel Door  <u>Annex F</u> Clamp Hanger Control Pendant Operation  <u>Annex H</u> Helium Leak Rate Decision Matrix	<p><b>Task:</b> Close and Seal Containment Vessel Door IAW EDS Phase 2 Series SOP.</p> <p><b>Conditions:</b> Close containment vessel door per Procedure 9, Steps 1.0 thru 1.2, 1.4 (omit detonator cables), 2.0 thru 3.1, 5.0 thru 8.8. <b>Note: Prior to performing Step 8.2, verify control buttons (IN, OUT) on Clamp Hanger Control Pendant are operational per Annex F, Steps 1.1, 2.1 thru 2.3, 3.3, and 5.0 thru 5.3. Record upper and lower gap measurements.</b></p> <p>Conduct helium leak test on containment vessel door and high voltage flange per Procedure 9, Steps 9.0 thru 9.12.6. Verify leak rate achieved is IAW Annex H. Vent containment vessel per Steps 10.0 thru 11.7. <b>Note: Record value of leak rate obtained.</b></p>

<b>References</b> EDS Phase 2 Series SOP	Limited Functional Test Procedures
<p><u>Procedure 12</u> Chemically Treat EDS Containment Vessel Contents</p> <p><u>Annex D</u> Vessel Rotation Control Pendant Operation</p>	<p><b>Task:</b> Chemically Treat (Simulated) EDS Containment Vessel Contents IAW EDS Phase 2 Series SOP</p> <p><b>Conditions:</b> Position containment vessel to the FILL position per Steps 2.0 thru 2.2.10.</p> <p>Transfer 100 liters of heated water from supply tank 2 by use of reagent supply pump to the containment vessel per Steps 3.0 thru 4.3. Transfer 50 liters of heated water from supply tank 2 by use of water supply pump (alternate procedure) to the containment vessel per Steps 3.0 thru 3.3, 9.0 thru 9.1.9, 4.3, and 4.4. Transfer 50 liters of water from a 55-gallon liquid drum by use of hand truck pump (alternate procedure) to the containment vessel per Steps 10.0 thru 10.6.2, 4.3 and 4.4.</p> <p>Commence vessel rotation per Steps 5.0 thru 5.8. Immediately after auto rotation is identified as being satisfactory, halt vessel rotation and verify use of Vessel Rotation Control Pendant per Annex D. Resume auto rotation per Steps 5.0 thru 5.8.</p> <p>Turn on containment vessel heaters and heat vessel contents to 60 ±5°C per Steps 6.3 thru 7.0. Rotate containment vessel for a period of one hour at the temperature stated above.</p>
<p><u>Procedure 13</u> Collect Treated Liquid Sample</p>	<p><b>Task:</b> Collect Treated (Simulated) Liquid Sample from valve panel IAW EDS Phase 2 Series SOP.</p> <p><b>Conditions:</b> Collect Treated (Simulated) Liquid Sample from valve panel per Steps 2.0 thru 7.0. <b>Note: Water is used for decontamination of line in lieu of actual reagent.</b></p>
<p><u>Procedure 14</u> Remove Treated Liquid Waste From EDS Containment Vessel</p>	<p><b>Task:</b> Remove Treated (Simulated) Liquid Waste From EDS Containment Vessel IAW EDS Phase 2 Series SOP.</p> <p><b>Conditions:</b> Drain the water simulating a chemical neutralant from the containment vessel per Steps 1.0 thru 4.8. <b>Note: Simultaneously, collect a liquid sample from liquid waste stream (through valve 28) during vessel drain. Prior to completion of drain, implement alternate effluent transfer per Steps 12.0 thru 12.9.6.</b></p>
<p><u>Procedure 15</u> Rinse and Drain Containment Vessel</p>	<p><b>Task:</b> Rinse and Drain Containment Vessel IAW EDS Phase 2 Series SOP.</p> <p><b>Conditions:</b> Transfer 100 liters of heated water from supply tank 1 by use of water supply pump to the containment vessel per Steps 1.2 thru 2.5. Transfer 50 liters of heated water from supply tank 1 by use of reagent supply pump (alternate procedure) to the containment vessel per Steps 10.2 thru 10.2.1.7 and 2.3 thru 2.5.</p> <p>Commence containment vessel rotation per Steps 3.1 thru 3.2. Set containment vessel heater setpoint to 105°C per Steps 3.3.1 thru 3.7. Rotate containment vessel for a period of one hour at the stated setpoint.</p> <p>Drain containment vessel per Steps 5.0 thru 7.2.</p>



<b>References</b> EDS Phase 2 Series SOP	Limited Functional Test Procedures
<u>Procedure 16</u> Collect Vapor Sample	<p><b>Task:</b> Collect Vapor Sample IAW EDS Phase 2 Series SOP.</p> <p><b>Conditions:</b> Purge Containment Vessel with Helium per Steps 1.0 thru 1.13</p> <p>Collect Vapor Sample in a 10 L Bag per Steps 10.0 thru 10.5.4. <b>Note:</b> <b>Labeling Tedlar® Bag and transfer to monitoring personnel is not required.</b></p>
<u>Procedure 17</u> Open Containment Vessel Door	<p><b>Task:</b> Open Containment Vessel Door IAW EDS Phase 2 Series SOP.</p> <p><b>Conditions:</b> Open containment vessel door per Steps 1.0 thru 8.6, and 8.10.</p>
<u>Procedure 19</u> Clean and Prepare Equipment	<p><b>Task:</b> Clean and Prepare Equipment IAW EDS Phase 2 Series SOP.</p> <p><b>Conditions:</b> Service, clean, and prepare the EDS equipment for final servicing prior to departure per Steps 1.0 thru 3.0, 6.2 thru 8.0, 10.0, 14.0 thru 19.0, 21.0 thru 22.3, 25.0 thru 32.0. <b>Note:</b> <b>In the steps listed above, there is no requirement to decontaminate parts; omit all references to decontaminate with household bleach.</b></p>
<u>Procedure 20</u> Drain Supply Tanks	<p><b>Task:</b> Drain Supply Tanks IAW EDS Phase 2 Series SOP.</p> <p><b>Conditions:</b> Drain water from supply tanks 2 and 1 into 55 gallon drums per Steps 1.2 thru 2.3.</p>
<u>Procedure 22</u> Checklist for EDS Closeout	<p><b>Task:</b> Perform Breakdown EDS Operations Area IAW EDS Phase 2 Series SOP utilizing Table 22-1, Items 7 thru 28.</p>

Notes:

EDS = Explosive Destruction System  
IAW = in accordance with  
SOP = Standing Operating Procedure

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